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And there's no time off for gassing 'bout the date you had last night,
For you know it would be foolish, and you save your precious breath,
For the only date you're keeping is a rendezvous with death.

And you feel the fevered silence
As the sun begins to sink,
Time is short and growing shorter,
It is later than you think.

When you're home and working steady you have time to shoot the bull
For the boss ain't always looking and his hands are kinda' full,
You can grouse about your wages; you can sneak out for a smoke;
You can leave the drill press idle while you hear or tell a joke;
But the pay-off's coming later for the job you haven't done,
When the fighting isn't over and the battle isn't won.
For the forge that's lying idle forges chains you cannot see
'Til you find a stricken Nation in the bonds of slavery.

And eternity will damn you
As your soul begins to shrink,
Time is short and growing shorter,
It is later than you think.

Some are born to do the fighting, some must work and some must pray.
But there isn't one among us who can sit and rest today;
For the freedom that we cherish puts a levy on our soul,
And we may not shirk our duty 'til we reach that final goal.

For the time is growing shorter
As we near destruction's brink,
And your job needs lots of doing,
IT IS LATER THAN YOU THINK!

(Author Unknown)

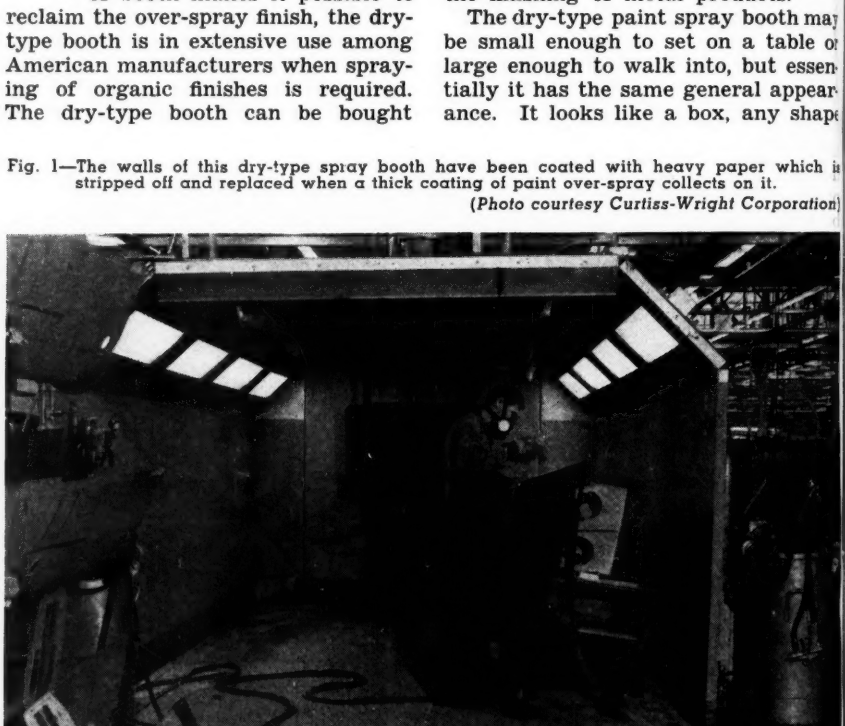
Skinning the Dry-Type Spray Booth

By ROBERT HOLDER
Harris Soap Company, Buffalo, New York

ALTHOUGH the war has highlighted the water-wash paint spray booth since this kind of booth makes it possible to reclaim the over-spray finish, the dry-type booth is in extensive use among American manufacturers when spraying of organic finishes is required. The dry-type booth can be bought from a catalog, in standard or special sizes, to handle practically every kind of production work, including the finishing of metal products.

The dry-type paint spray booth may be small enough to set on a table or large enough to walk into, but essentially it has the same general appearance. It looks like a box, any shape

Fig. 1—The walls of this dry-type spray booth have been coated with heavy paper which is stripped off and replaced when a thick coating of paint over-spray collects on it.
(Photo courtesy Curtiss-Wright Corporation)



box, but usually rectangular or square, and it has an exhaust fan set in the rear wall to draw out the paint fumes and the pigment-laden air. Baffle plates are suspended just in front of the fan to act as a sort of "tonsil," catching the paint particles before they can get to the fan blades and collect there. Too much collection of paint pigment on the fan blades will slow down the fan and decrease the exhausting efficiency of the unit.

This type of spray booth has a cleaning method entirely different from that of the water-wash equipment, and it is the purpose of this article to present that method together with various applications. The seriousness of the cleaning situation depends upon local conditions in each plant.

For instance, if a spray booth is in use only an hour a day, then there is little or no cleaning problem, since the amount of paint sprayed has a definite relationship to the thickness of the paint encrustment that has to be removed. If there is only a slight "misting" of over-spray on the booth walls, this can easily be taken off by rubbing with a rag wetted down with thinner. Most operators of spray painting equipment, however, are not that fortunate. It is not unusual for factories to have six to twenty spray booths of the dry-type. One large camera manufacturer has a battery of small spray booths numbering several score. Any maintenance executive concerned with keeping these booths paint-free has a real task on his hands.

For the spray booth that gets continuous daily use, becoming heavily "dirtied" with paint, lacquer, enamel, and so on, there are many ways and a variety of materials to use in keeping it clean. You can take your choice, since they all "work," but not in the same manner.

One very popular method and perhaps not very efficient way as far as time and material are concerned is to line the spray booth with heavy cardboard or kraft paper. This means that the paper must be cut to the size of the walls and the ceiling of the spray booth. Then gummed tape is used to fasten the paper to the spray booth walls. Some spray booth operators daub heavy grease on the spray booth walls first and then stick the paper to it. Newsparer can be used in place of the kraft paper. Money would be saved, but the appearance would certainly not be contributive to good plant housekeeping.

The disadvantages of using kraft paper are several. To begin with, when the paper becomes heavily coated with paint over-spray it will loosen itself from the spray booth wall and fall upon the work being sprayed. To correct this condition either the offending section of paper must be pasted up again with stronger gummed tape, or the piece ripped out and a new piece pasted up. All of this takes time and cuts down production on the finishing line.

The continued blast of air upon the paper, together with the suction of air from the booth by the exhaust fan tends to dry out the paper and renders it a fire hazard, the more so as it becomes more thickly befouled with paint, lacquer, or enamel overspray. Many of the "war finishes" are of a highly inflammable nature and any cleaning method adding to the danger of fire should be considered with caution. Even if adequate fire protection is maintained in the spray painting area, no plant can afford the decrease in worker morale that occurs when a factory fire starts.

Another disadvantage of the papering method is the fact that no protection is possible for odd angles of the booth, automatic sprinkler outlets, fan blades, exhaust flues, or booth lights. Placing a paper bag over the automatic sprinkler outlet is not rec-

ommended since, in the event of a fire, the paper bag keeps the heat away from the outlet, thus delaying the sprinkling action.

A general view of a modern DeVilbiss dry-type spray booth lined with paper is seen in Fig. 1. The exhaust fan in this booth is in the ceiling at the rear because the booth is not next to the outer wall, and also because the back wall of the booth opens automatically to admit a new wing part when the previous one has been sprayed. The baffle plates fold up to the ceiling like the retractable landing gear of a plane when the rear panels open.

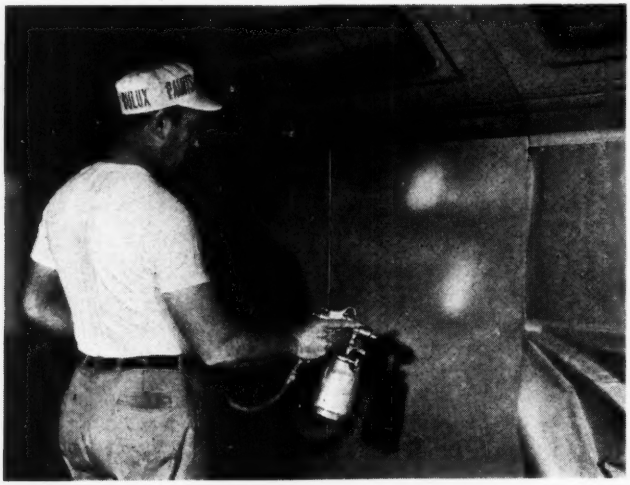


Fig. 2—Adjoining sections of the booth wall show the contrast between the papering method and the booth coating method. The two white spots on the wall were given an extra heavy spraying to show what the coating looks like before it becomes transparent.

Dry-type spray booths can be cleaned by brushing a detergent on the booth walls. Several brands of detergent are available. This material is bought in powder form, mixed with water and then brushed on the metal areas to be protected. When the booth is to be cleaned, it is possible to scrape off the detergent in flakes carrying the paint accumulation with it. This method is fairly economical, decreases the fire hazard considerably and has no real disadvantages. However, it has some inconveniences which might be mentioned.

Since the material has to be prepared before applying, it is necessary to keep containers available just for this mixing process. Sometime the paint encrustment will flake off on the work being painted because the detergent dries out to a milk-white powder, assuming its original chemical make-up; this dryness of the detergent makes it difficult to hold heavy accumulations of paint to the spray booth wall without some of it breaking away if the spray booth is vibrated or banged in any way. Finally, removing the accumulated paint is a dusty job, since the flaked-off paint and detergent send up small clouds of "dust" as they crumble to the spray booth floor.

Still another way to protect the steel walls from the paint over-spray is to brush on a coating of thick grease. When the paint builds up sufficiently the accumulation can be removed with comparative ease. But this method has strong disadvantages, one of them with a patriotic flavor. Grease is a strategic material, already short, and should not be used in such a "wasteful" way. Many pounds of grease are needed to cover an average size spray booth and this

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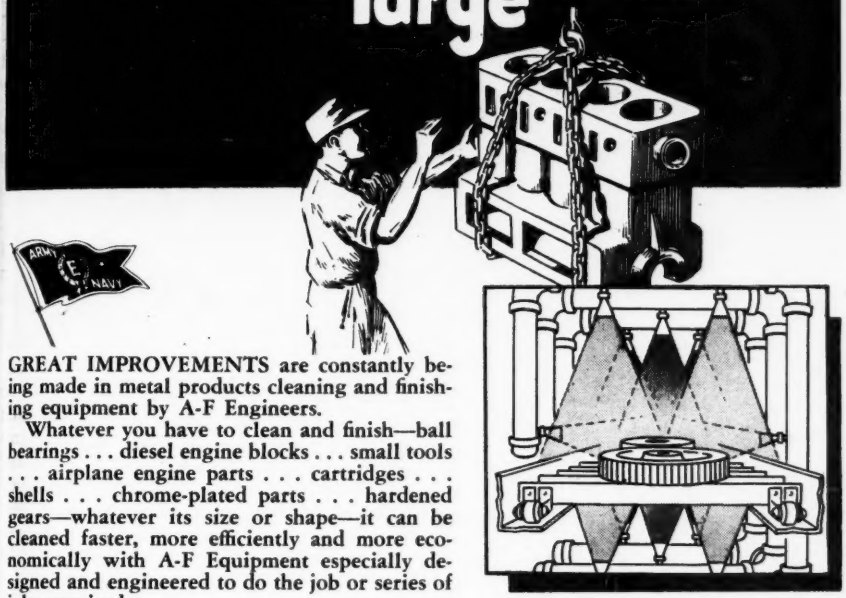

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Fig. 3—The ease with which waste paint accumulation is stripped from a conveyor arm is demonstrated here. The conveyor is used in conjunction with the spray booth. (*Photo courtesy Curtiss-Wright Corporation*)

must be done each time the booth is cleaned, since most of the grease is lifted off the spray booth walls with the discarded paint. (One pound of grease will cover approximately 40 square feet of wall space.)

Further, the grease near the blast of the spray gun and that close to the exhaust fan oxidize rather quickly and any place where this oxidation occurs will cause the paint over-spray to stick just as if there were no grease present at all. This means that when the spray booth is cleaned, the dried out areas have to be laboriously scraped to free the metal of the clinging paint. Of course, if the spray booth is cleaned once a week, enough oxidation will not ordinarily have taken place to cause trouble. Operators are fooled, however, into letting their spray booths go for weeks without cleaning because they observe little paint accumulation. Then when they try to remove the gobs of paint later, they discover that the grease has dried out and they have to spend needed extra hours scraping off the accumulated paint.

Lastly, grease is inflammable and increases the fire hazard of the spray painting section of the factory. When a fire starts, whatever the cause, the presence of the grease results in a bigger blaze and one that spreads more quickly into the other parts of the plant.

In the opinion of the writer, the best protection for spray booth interiors so that cleaning is simple, safe and economical, is to use one of the special spray booth coatings recommended by the manufacturers of spray booths and supplies. These

Fig. 4—Lacquer, oil stain, enamel and other paints are combined in the accumulation being stripped off the spray booth wall which was previously coated with protective material.

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coatings are engineered to take care of the spray booth cleaning problem with the minimum of time and the maximum of efficiency, and with small cost. The writer's experience in this field has been primarily with a company which has carefully investigated the spray booth field and has produced a number of meritorious products.

For example: Boothcote, as the material is called, comes ready-mixed and can be applied either by brush or by spray gun. Any standard spray gun can be used with regular "painting" pressure employed. All vulnerable areas of the booth can be coated; walls, ceiling, lights, fan blades, automatic sprinkler outlets, exhaust flues, and so on. When the spray booth coating is applied it looks like a thin coating of flat white paint, but in 10 minutes it becomes tacky and transparent. It does not dry out over a long period of time and for this reason it can be used in parts of the spray booth that are not cleaned often, sometimes not for six or eight months, such as flues, high ceilings, and so on. The transparent appearance makes the spray booth look as clean as it could appear in the places where as yet the paint over-spray has not had time to accumulate and hide the clean metal.

Figure 2 presents the interior of a spray booth at a large airplane plant, contrasting the papering method with the spray booth coating method. Note the buckled, unattractive appearance of the paper. The coating material is now used in this plant. The operator played the spray gun heavily on the two white spots on the wall to illustrate what the coating looks like before it becomes transparent.

This coating material contains no grease, hence it is not chiefly a strategic material. It is non-inflammable so there is no increase to the fire hazard. In fact, the fire hazard is reduced, since spray booths are cleaned more often because of the ease of the operation and dangerous build-ups of paint residue do not occur.

When the paint has accumulated on top of the coating it can easily be stripped off in large sheets as soon as the paint is thick enough and dry enough to form a film. It is the paint itself that strips off, not the coating. This product is harmless to the skin, non-toxic and emits no fumes or odor of any sort when sprayed. It is not necessary to turn on the exhaust fan when this coating is sprayed on the booth surfaces.

Fig. 5—A product designed to simplify the cleaning of spray booth floors has recently been introduced. It is applied and used in a similar manner to the wall coating.

The ease with which waste paint can be stripped clean from areas subject to over-spray accumulations is demonstrated in Fig. 3. Here the enamel is being sheeted free from a conveyor arm which had previously been coated with the coating material. Figure 4 shows another example of the removal of built-up paint accumulation. The booth is located in the Hard Mfg. Company plant in Buffalo, New York, where hospital equipment

TOMORROW'S PLANNING Today
Among the many things that war production has forced modern industry to recognize is the importance of more exacting, faster acting cleaning methods prior to plating or finishing operations. Plans for post-war production show that products will have to be turned out at an increasingly high rate of speed in order to lower costs. Blistering, peeling and poorly finished surfaces will be past history for manufacturers have learned to lick the bugaboo of pre-war production through the use of individually developed compounds. MAC DERMID INCORPORATED was one of the first chemical companies to exploit the importance of "made to measure" compounding and tomorrow, as yesterday, will continue to devote their efforts to more efficient finishing room production . . . Write for free Data Sheets and folders.

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is manufactured. The accumulation being stripped off is a heterogeneous combination of lacquer, oil stain, enamel and other paints. The coating material is said to work equally well with any one of these finishes or with any combination of finishes.

Since the material remains moist there is no danger of the paint encrustment flaking off because of dryness, resulting in spoiled finishes. When the operator has finished coating his booth, he can easily clean his gun of the coating with water and use the same gun immediately to begin his painting. This spray booth coating is effective with all finishes—not only lacquer, enamel, shellac and varnish, but also primer, airplane dope, flock, asphalt base paints, stain, latex and the "war finishes."

A product known as "Floorcote" is now available for use on the floors of spray booths in the same way that the coating described above is employed on the walls. The material is compounded in such a way that it can be walked upon or trucked upon without its efficiency being affected. When paint accumulations get too thick they can be sheeted away from the floor just as waste paint is stripped from the walls. Figure 5 shows the removal of paint accumulation from the floor of a spray booth in the Hart Mfg. Company, Buffalo, New York.

Thomas Trucks. The Thomas Truck and Caster Co., Keokuk, Iowa, has available for distribution Catalog No. 43 which describes the trucks, casters and wheels manufactured by this company. The catalog is divided into sections devoted to the following products: platform trucks, Jak Tung trucks, wagon trucks, trailers, dollies, two-wheel trucks, casters and wheels. More than one thousand superstructures which fit any Thomas basic truck model are available under the name of "Job-Suited" trucks. The book is amply illustrated and includes descriptions and specifications of the various products. To obtain a copy of Catalog No. 43, address a request on your company letterhead.

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Munitions Bring Up Questions, Too

By JEFFREY R. STEWART

Flame priming, coating by the electric spray method, fire-retardent paints, film thickness, and painted vs. unpainted aircraft are just a few of the interesting subjects discussed by the author. Yes, munitions do bring up questions—and we give you both the questions and the answers.

PLEASE explain how munitions can be coated by means of the electric spray method?

In this new method an electric field is produced around the article to be coated by means of charged points or fine wires so that electric charges are imparted to the sprayed particles. This is done in such a way that the particles are attracted to the metallic object. The object is sprayed in the usual manner except that a low air pressure is used along with a well-thinned paint. Mr. Harold Ransburg, of Harper J. Ransburg Company, Indianapolis, Indiana, who originated the idea, claims that paint consumption can be greatly reduced by the use of this process. So far this method is not extensively used, but it has been considered as having future possibilities.

What is "flame priming?"

This is a method for treating munitions prior to painting. A hot flame is used to clean the iron or steel, removing loose scale and any dehydrating rust. However, the heat is not severe enough to remove the desirable and firmly bonded scale which serves as a partial protection against corrosion. The paint is applied to the metallic surface while it is still warm. This treatment also increases the corrosion resistance of the paint and improves the adhesion.

What are the requirements of fire-retardent paints when applied to munitions? How many types are there?

Fire-retardent paints should comply with the following requirements:

1. When applied to steel surfaces and exposed to fire on the reverse side, the paint film should not catch fire.
2. The fumes given off should be substantially non-toxic and should not flash.
3. The paint, during exposure to the heat of flames on the reverse side of the metal, should adhere to the steel surface and should not flake off or peel from the surface.
4. This result should be obtained over an anti-corrosive primer.
5. The paint should show a reasonable degree of flexibility and should

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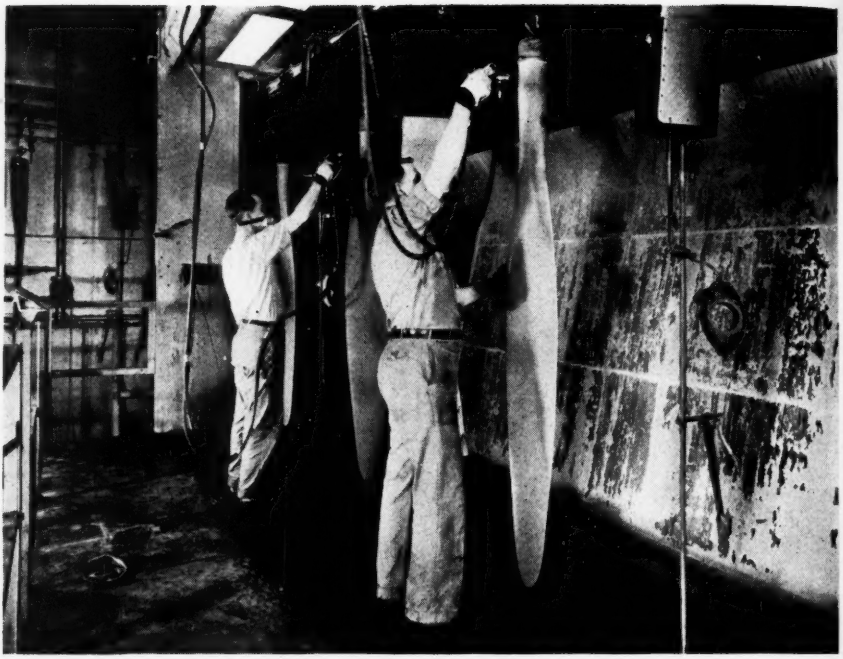

The workmen shown here are spraying airplane propellers in a modern water-wash spray booth. *(Photo courtesy DeVilbiss Co.)*

not chip off easily during use.

6. For the interior surfaces of ships, the paint should be resistant to washing with salt water soap and salt water. It should also be resistant to high humidity and have a high light reflectance.

7. A further desirable, but not essential, property would be non-inflammibility of the paint before application.

There are four types of fire-retardent paints. These are:

1. Silicate paints.
2. Chlorinated coatings.
3. Organic solvent-type paints.
4. Emulsion paints (most important type).

Can you give any information regarding infra-red reflectance standards and their relation to the finishing of munitions?

The Ordnance Department of the U. S. Army is now preparing a booklet dealing with this subject. It should be available for distribution in the near future.

In finishing munitions, what film thickness is necessary to obtain maximum service from the paint?

The primer coat should be approximately 0.5 mil in thickness and the finish coat should be approximately 1.2 mils in thickness, insofar as bomber and fighter planes are concerned. (A mil is one-thousandth of an inch. It is the unit of measurement used in the wire industry to measure diameters, but recently has been adopted in the paint industry to measure the thickness of paint films.)

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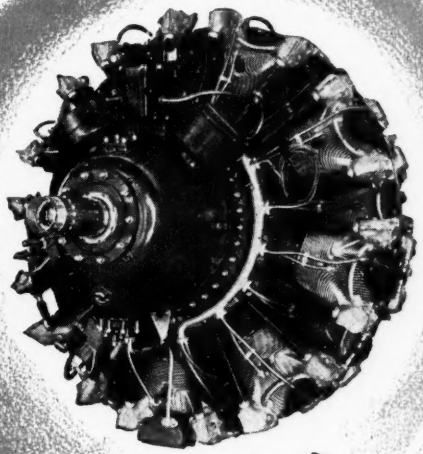

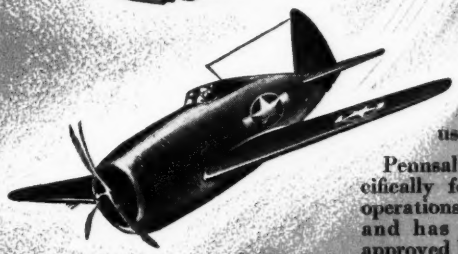

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Small aircraft parts are sprayed in batches. *(Photo courtesy DeVilbiss Co.)*

painted?

Yes, every exposed part is painted with the exception of the barrel of the gun.

What solvent is most widely used for thinning synthetic enamels which are applied to munitions?

Petroleum-type solvents with a high aromatic content or high solvent power serve this purpose.

What are some of the methods used to increase the adhesion of primers to aircraft metals such as aluminum alloys?

The metal must be thoroughly cleaned and degreased. It is also important to exercise care in the application of the zinc chromate primer. The coating should be applied as a very thin coat to effect maximum adhesion; this is especially true with the newer type synthetic enamels.

About what percentage of aircraft is coated with baking enamel as compared with air-drying enamel?

Only a very few aircraft parts are baked, the percentage being less than 10 per cent of the total area.

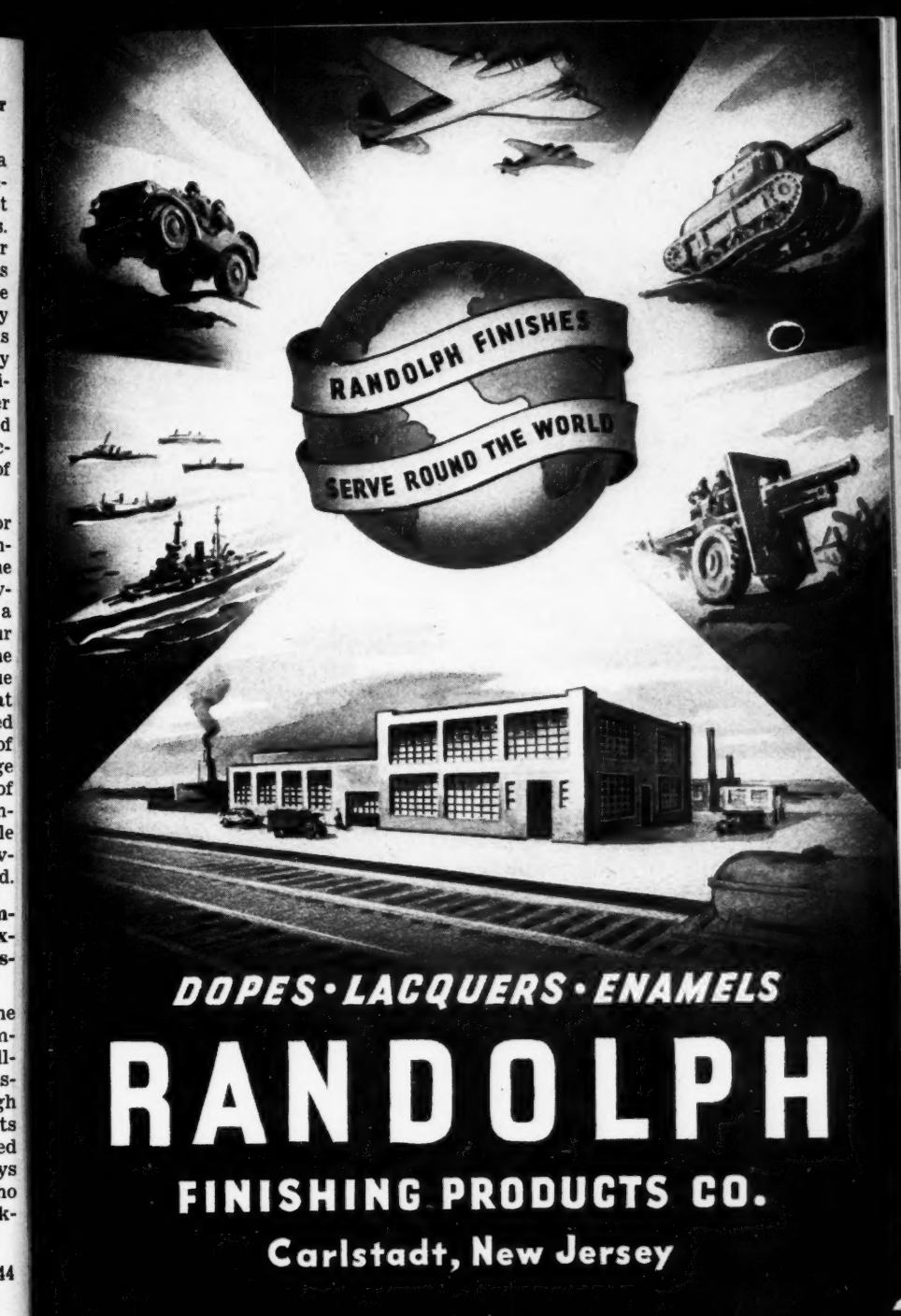
Can you give details of the decision of the War Department to eliminate the painting operations on war planes in order to increase speed?

Although it is true that such a decision was made by the War Department, most plants have not yet started producing unpainted planes. For instance, the Martin Bomber Plant in Baltimore, Maryland, was continuing to produce planes with the usual paint finish as late as January 15, 1944. Possibly the reason for this is due to the face that a great many parts had been painted with the primer and placed in storage. In order to make the change from painted planes to unpainted planes, it is necessary to use up the large backlog of stored material.

The final decision as to whether or not a plane will be painted or unpainted will be determined by the area commander. It has been discovered by the War Department that a speed of several extra miles per hour can be attained by eliminating the paint covering the plane. This is due to the decreased weight. The combat commanders feel that the decreased weight and increased speed is of greater value than the camouflage value of the paint. They also are of the opinion that a plane in flight cannot be made completely invisible with paint, but that camouflage coverings can conceal it on the ground.

What is the usual procedure employed by a paint inspector when examining a plane to see if it is satisfactorily painted?

During the construction of the plane the paint film is frequently damaged by the various craftsmen installing the parts. This makes it necessary for the painter to go through the plane several times during its construction to touch up the damaged films. This painter is almost always followed by the paint inspector who determines whether or not the workmanship is satisfactory.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The Chemistry of Electroplating

By Dr. C. B. F. Young, Consultant

Part 5

IN the preceding article the important subjects of chemical equations and calculations were discussed. This is of extreme value to the electroplater and should be mastered by him. In the latter part chlorine, sodium chloride, and hydrochloric acid were treated.

In the present article acids, bases, and salts are discussed, and under this heading are the ever-important normal and molar solutions. Calculations involving inverse proportions are illustrated. These also are very important to the electroplater. After these subjects have been treated, some time is spent on molecular weights and their uses. Next follows the subject matter on sulfur and some sulfur compounds. One should keep in mind that sulfuric acid and metallic sulphates are used in many plating baths. The methods for making sulfuric acid are given. The material provided herein is important to the plater.

Many compounds used by the electroplater can be divided into three groups; namely, acids, bases, and salts. In the first group a good example is sulfuric acid which is used in many electroplating plants to clean metals, decrease the pH of solutions, increase the conductivity of plating baths, and neutralize materials which are called bases. Acids have peculiar properties which distinguish them from bases and salts. All acids have hydrogen and hydrogen ions present.

It must be borne in mind at this point that an atom of hydrogen is quite different from an ion of hydrogen. This will be discussed in detail later. All acids have a sour taste and turn an indicator, litmus, from blue to red. Examples of acids are hydrochloric, sulfuric, nitric, and acetic. Acids unite directly with bases to form water and compounds called salts.

Bases have certain characteristics that can easily be recognized. They turn red litmus blue and, after dissolved in water, produce "slicky" solutions which have a bitter taste. It will be noticed that bases turn red litmus blue while acids turn blue litmus red. All bases contain the hydroxide radical (OH); thus the OH group is essential to bases, while the H group is essential to acids. A good example of a base is sodium hydroxide.

It is essential that the chemist have some methods whereby the strength of a solution can be standardized. It is possible to have strong and weak solutions, but chemistry, being an exact science, defines exactly what is meant by a strong or weak solution.

For analysis work it is necessary that the solutions used be made up to a certain defined strength. Just how can the strength of a solution be defined so as to always get uniform results? The electroplater in many instances makes up a solution by adding so many ounces or pounds of salt to one gallon of water. For instance, 12 ounces of nickel sulfate may be added to one gallon of water, thereby producing a solution in the neighborhood of 12 ounces per gallon.

It will be noted that the above says "in the neighborhood of," meaning that it will not be exactly 12 ounces per gallon regardless of the accuracy of the weight of salt, for the simple reason that the volume of salt is added to one gallon of water, which results in a volume of solution larger than one gallon. To make this clear, take the following example.

Suppose a solution is desired containing 200 grams of sodium chloride per liter of solution. Now, if one were to make this up by weighing out 200 grams sodium chloride and then adding a liter of water to the salt, it will be found that if the whole is measured there is well over a liter of solution. There would be a constant error if the volume of the salt always added were constant, but this is not true as the volume of nickel sulfate weighing 200 grams does not necessarily equal the volume of sodium chloride weighing 200 grams. The student can readily see just why other methods of defining solution are used by the analyst. True, the percentage of the solution can be used (the weight of the salt dissolved by the weight of the whole solution), but this also has its complications.

In order to do away with the above objections, the chemist generally uses two types of solutions—namely, molar and normal solutions. A molar solution contains one gram molecular weight of materials dissolved in one liter of solution. Please note by this definition that it does not say in one liter of water, but one liter of solution. An example will help to make this clear. The gram molecular weight of hydrochloric acid is 36.5 grams. Now if 36.5 grams of hydrochloric acid is dissolved in water the volume of which is less than a liter and, after dissolving, the resulting solution is then diluted to one liter, the resulting solution has 36.5 grams of hydrochloric acid dissolved in one liter or 1,000 cc of solution.

Another example: The gram molecular weight of sulfuric acid is 98 grams. Now by dissolving 98 grams in, say, 700 cc of water and then diluting the whole to 1,000 cc or one liter, the resulting solution will be M H_2 SO_4. M stands for molar solution. If an 0.1 M solution is desired (which is 0.1 as concentrated as the 1 molar solution) 98 is divided by 10 which gives 9.8, and one dissolving 9.8 grams sulfuric acid in 1,000 cc of solution an 0.1 M solution is produced.

Many solid materials crystallize with certain definite amounts of water encased in their molecules. For example, ordinary copper sulfate, which is $CuSO_4 .5H_2O$, has five molecules of water for every molecule of cupric sulfate. This water of crystallization must be taken into consideration when calculating the amount of material to be added in making a solution of definite strength. The reason for this is obvious, as the water will be weighed along with the salt. In figuring the amount of $CuSO_4 .5H_2O$ to be dissolved, the $5H_2O$ must be included in the formula weight. For example, an M solution of cupric sulphate is as follows:

$CuSO_4.5H_2O = 249.57$

Cu	$63.57 \times 1 = 63.57$
SO_4	$9600 \times 1 = 96.00$
$5H_2O$	$5 \times 18 = 90$
	249.57

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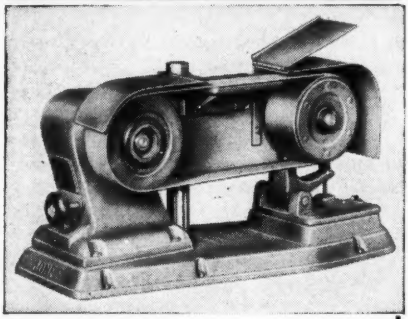

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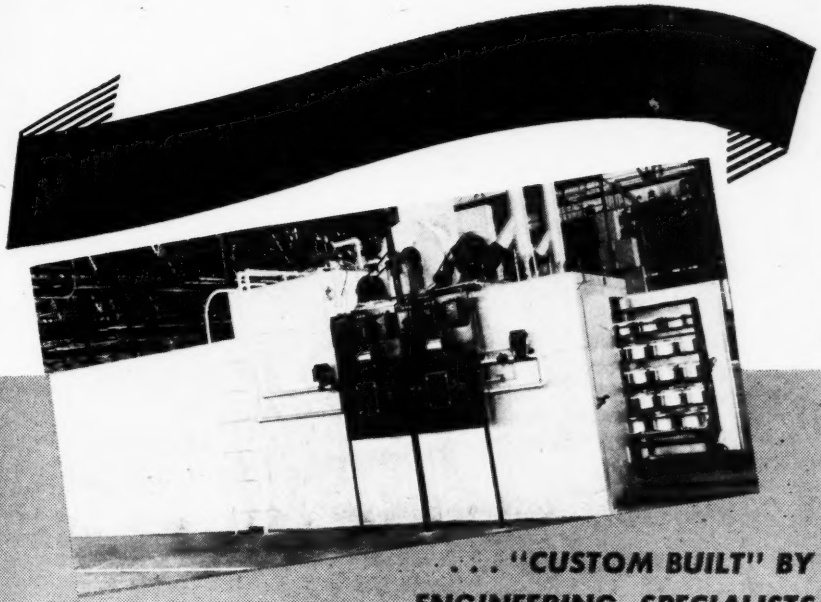
molecular weight of $CuSO_4$ is 159.57, while in $CuSO_4.5H_2O$ it is 249.57.

For certain types of experiments the chemist has found another type solution useful. This is known as the normal solution, and it contains one gram equivalent weight of material dissolved in one liter of solution. The only difference between the normal and the molar solutions is that the molar solution contains one molecular weight, while the normal solution contains one equivalent weight. The gram equivalent of a compound is the weight which contains one gram equivalent weight of an element or radical. Therefore, the gram equivalent weight of an element can be defined as the weight which is equivalent to a gram of oxygen or 1.008 grams of hydrogen.

Thus, it will be noted that the equivalent weight is nothing more than the molecular weight divided by the valence. The molecular weight of hydrogen is equal to 1.008 and, as this is divided by its valence which is 1, the result is $\frac{1.008}{1}$ which is 1.008. However, the molecular weight of oxygen is 16 but its valence is 2, and 16 divided by $2 = 8$.

Take this reasoning over to a compound. Suppose the equivalent weight of sodium chloride is desired. The molecular weight of sodium chloride is 58.5. The valence of the chloride is 1; therefore, its equivalent weight is 58.5 divided by $1 = 58.5$. Sodium sulfate, for example, (Na_2SO_4), $=$ 142. It will be noted that there are two sodiums for every one sulfate; therefore, the valence of the sulfate radical is two and it requires two sodiums.

Another way of obtaining the amount is to find the hydrogen equivalent. Thus, two hydrogens are required to take the place of the two sodiums, as both have a valence of one. Therefore, the molecular weight



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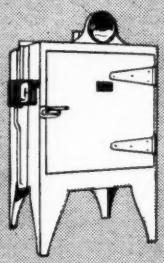

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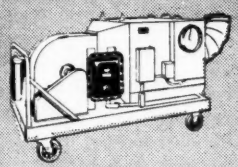

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of 142 must be divided by 2 which = 71. In this case 71 grams dissolved in 1,000 cc solutions = 1 N solution. An 0.1 N solution is obtained by dividing the amount necessary to make 1 N by 10. For sodium sulphate an

$$\text{0.1 N solution would be } \frac{71}{10} = 7.1.$$

Another example will be used to illustrate the above. Take aluminum chloride. One gram molecular weight of this material contains 133.5 grams, but one gram equivalent weight contains $\frac{133.5}{3}$ which is 44.5. The reason for dividing by 3 is that aluminum equals three hydrogens. The illustration below will help to clarify this:

One Al and three Cl make up

$$AlCl_3,\ (Al \begin{cases} - Cl \\ - Cl \\ - Cl \end{cases})$$

Substituting H for Al we have:

$$\begin{aligned} H &- Cl \\ H &- Cl \\ H &- Cl \end{aligned}$$

Therefore, 1 Al = 3 H

Thus, one hydrogen is equivalent to one-third aluminum. The table below will serve to summarize all the above.

Compound	Molecular Wt.	N. Solution	M. Solution
HCl	36.5	36.5	36.5
H_2SO_4	98	49.0	98.0
$AlCl_3$	133.5	44.5	133.5
$CuSO_4.5H_2O$	249.57	124.78	249.57

If equivalent quantities of an acid and a base are brought together, it will be noted that the outstanding properties of both disappear. Thus, an acid can be neutralized by a base, or vice versa. The neutralization can be followed provided certain materials called "indicators" are added to the solutions. Litmus is a good example of such materials. This becomes a blue color if introduced into a basic solution and red if placed into an acid solution. Thus, one can tell by the color of a solution whether it is an acid or a base solution.

Furthermore, it is possible to find out the amount of an acid or base present in an unknown solution. This is accomplished simply by adding to the unknown solution enough of a known solution to neutralize the first. When neutralized, the amount of the known can be calculated, and from this the unknown can be obtained by a mathematical relationship. An illustration perhaps will make the above clear. Suppose some litmus is added to hydrochloric acid which is contained in a beaker. The solution will assume a red coloration. If some ammonium hydroxide is added in small amounts it will be noted after a time that the red color remains about the same. After some time, however, the color immediately turns into a blue. Thus, the end or neutralization point has been reached.

In the above example hydrochloric acid was neutralized with ammonium hydroxide, the reaction being

$$NH_4OH + HCl = NH_4Cl + H_2O$$

The ammonium hydroxide used can be assumed to be a known strength, say 0.1N. Assume also the amount of this material added was 25 cc and the volume of hydrochloric acid used equaled 10 cc. To summarize, 25 cc of NH_4OH of 0.1 N was used to neutralize 10 cc of HCl of unknown (N) Normality. The unknown quantity is the normality of the HCl. In solving this an inverse proportion is used. This is different from the proportion used heretofore, namely, direct proportion. The reason for this will be seen quickly if the results are analyzed.

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lution used, the smaller the volume which will be required to neutralize the unknown solution. For instance, a 0.1 N solution of hydrochloric acid contains 3.65 grams per liter while an N solution contains 36.5 grams per liter. Therefore, if it takes 10 cc of an 0.1 N solution, it will require only 1 cc of a normal or N solution. How was this answer produced? Simply:

$$10 \text{ cc} \times 0.1 = X \times 1$$

Solving for X

$$10 = 1X$$

$$X = 1$$

Therefore, X = 1 cc. Putting this down in everyday English; one would have 10 cc of an 0.1 N HCl solution = X cc of an N HCl solution. Let us take this over to the problem and mark down everything that is given:

Given $NH_4OH = 0.1$ N

25 cc of the above used to neutralize 10 cc of an unknown HCl. Required: Normality of HCl.

Reason on this a few minutes and see just what can be found concerning this problem. It will be noted in this case that a larger volume of ammonium hydroxide was required than of the HCl. Immediately it is known that the HCl is stronger than the NH_4OH and is in the ratio of 10 to 25 or about two and one-half times as strong. So, it is now known that the answer should be much more than 0.1 N. Setting up the equation one should have: Normality of base x cc of base used = normality of acid x cc of acid used.

Substituting in the above equation:

$$0.1 \times 25 = X \times 10$$

Solving for X:

$$2.5 = 10X \text{ or } 10X = 2.5$$

$$X = .25$$

It will be noted in this case that the normality of the hydrochloric acid is larger than the normality of the base.

From the last chemical equation written ammonium hydroxide united with hydrochloric acid to form water and another type of chemical compound. This material, which is called ammonium chloride, is known as a salt and is formed by the uniting of an acid and a base. Salt can also be formed by replacing the hydrogen of an acid by a metal. For instance:

$$2HCl + Zn = ZnCl_2 + H_2$$

Here zinc chloride is the salt. Salts are very important to the electroplater, as most plating baths are made from these materials. Thus, a nickel plating solution contains nickel sulphate, and ammonium or sodium chloride. Tin baths contain sodium stannate or stannite, sodium acetate or stannous or stannic chloride. Such illustrations could be given for most plating solutions. Salts are important in the plating field.

Gay Lussac, in 1805, found that in any chemical reaction the volume of all gases entering the reaction are to each other as the ratio of small whole numbers. A little later Avagadro explained this by saying that equal volumes of all gases under the same conditions of temperature and pressure contain the same number of molecules. For example, one liter of chlorine contains the same number of molecules as one liter of any other gas provided that all gases are at the same temperature and pressure. There will be the same number of molecules in one liter of hydrogen chloride, water vapor, hydrogen, oxygen, or any other gaseous material. Avagadro made no assumptions as to how many molecules were present in a volume of gas, but it can be clearly seen that comparative weights of the molecule can be obtained by comparing equal volume of the gases at the same conditions.

Time and time again we have referred to hydrogen as being H_2; oxygen, O_2; chlorine, Cl_2; and nitrogen, N_2, and so on. Undoubtedly, the question has arisen in the reader's mind as to why one says H_2. Scientific facts, and not mere assumptions, are in back of this reasoning. If the reaction below is taken, the above can be answered.

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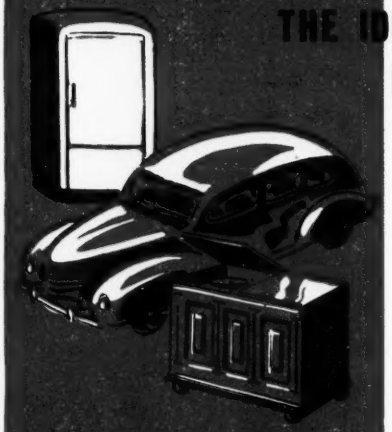

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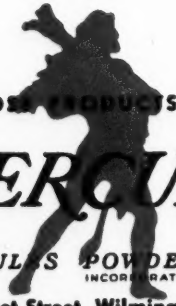

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H_2	+	Cl_2	=
1 vol. hydrogen		1 vol. chlorine	
HCl	+	HCl	
1 vol. hydrogen chloride		1 vol. hydrogen chloride	

It will be noted that one volume of hydrogen will unite with one volume of chlorine to produce two volumes of hydrogen chloride. If one goes back to the original theory of Avagadro, it will be seen that two volumes of hydrogen chloride contain twice as many molecules as the one volume of hydrogen. Now, hydrogen chloride has a very definite amount of hydrogen. So it must be assumed that the hydrogen molecules break down into at least two parts and each part unites with chlorine to produce a molecule of hydrogen chloride. Thus, if the hydrogen molecule contains two atoms of hydrogen, its molecular weight must be H_2 so that its molecular weight would be $2 \times 1 = 2$ (approximately).

(If the value of exactly two is given for the molecular weight hydrogen and one for the atomic weight, this would make the relative weights of the other elements to run into fractions. On this basis oxygen molecule would be 31.746. Scientists have agreed to make oxygen 32 exactly and obtain the atomic weight of hydrogen as 1.008.) By the above method it can also be proved that oxygen is composed of O_2 and not O For instance:

$$H_2 + H_2 + O_2 = H_2O + H_2O$$

This may be explained as follows:

1 volume hydrogen	+	1 volume hydrogen	+	1 volume oxygen	=	1 volume water	+	1 volume water

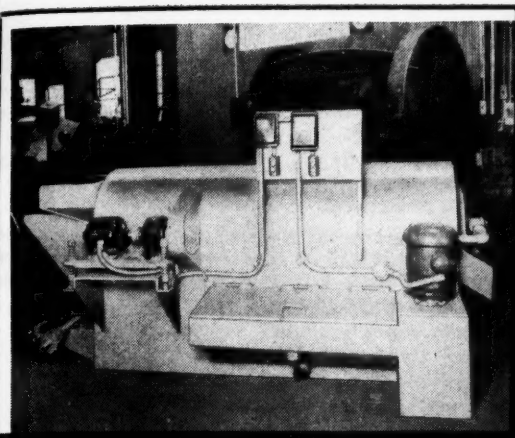
It will be noticed in this case that two volumes of hydrogen unite with one volume of oxygen to produce two volumes of water. Now each volume of water contains definite amounts of oxygen. Therefore, one has at least two volumes of water containing some oxygen which means that the oxygen molecule broke into smaller parts (at least two parts) to form this water. Thus, the molecular formula weight of oxygen is O_2.

In the chemical equation the coefficients of all materials in the gaseous form represent the relative volumes of the substances uniting. Take for example the equation:

$$2H_2 + O_2 = 2H_2O$$

From this one notices that two volumes of hydrogen are required to unite with one volume of oxygen, producing, thereby, two volumes of water. If 2,000 cc of hydrogen burns to give water, it can be seen at once that one-half this volume of oxygen, or 1,000 cc are required to unite with this amount.

If a chemist goes to the laboratory and takes a gram molecular weight of hydrogen and then measures the volume of this material at standard conditions (at a given temperature and pressure) he will always find that the volume occupied by this gas will equal 22.4 liters. Now, if a gram molecular weight of chlorine which is a weight equal to the molecular weight of chlorine (70 grams approximately) is substituted for the hydrogen and the volume of this is taken at standard conditions, it will be found again that the volume is equal to the volume of the hydrogen, namely 22.4 In every case it will be found that the volume occupies 22.4 liters. Therefore, the gram molecular weight of all gases occupies the same volume, namely 22.4 liters. It will also be noted that if the gram molecular weight is divided by the density, the result is constant, namely, 22.4 liters.



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In 1818 Dulong and Petit observed that if the atomic weight of an element is multiplied by its specific heat the result is a constant of about 6.4. The specific heat of a substance is equal to the number of calories required to raise the temperature of one gram of material 1 degree Centigrade. It might be pointed out that this law does not hold exactly, but it does serve as a rough guide when one is in doubt. Thus, the atomic weight x the specific heat = atomic heat. Taking copper for an example: 0.0923 x 63.6 = 0.588. While silver gives: 0.056 x 107.88 = 6.12.

The section dealing with molecular weights is not highly important to the electroplater, but in order that he should have some idea of the workings of chemistry it has been discussed. The gas laws could have been studied in order to make the article more complete, but the author feels that such material is unnecessary for the electroplater.

Sulfur occurs in nature in various parts of the earth. It occurs in the natural form in the United States and in combination in Sicily, Iceland, Mexico, and Japan. Iron pyrites, which is ferrous sulfide, and the sulfides of copper, zinc, and lead are widely distributed.

Sulfur occurs in several forms. Rhombic sulfur occurs at any temperature below 96 degrees. It is a yellow solid having a density of 2.06 and melting point of 112.8 degrees C. Monoclinic sulfur is obtained when sulfur is heated above 96 degrees. Its melting point is 119 degrees C. and the density is 1.96. The monoclinic slowly changes into the rhombic variety at room temperature. Both of these forms of sulfur are soluble in carbon disulfide, but insoluble in water. As the temperature of sulfur is raised, the color becomes darker and the solution gummier. At 260

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degrees the material becomes so viscous that it will not flow out of a container. The boiling point is 445 degrees C. After boiling, if sulfur is chilled by cold water, a mass remains which is a mixture of the rhombic variety and amorphous sulfur.

Sulfur generally has a valence of two and reacts readily with a great many metals and other elements, gold and platinum being exceptions. Thus:

$$Fe + S = FeS$$
$$Zn + S = ZnS$$
$$2Ag + S = Ag_2S$$
$$H_2 + S = H_2S$$
$$S + O_2 = SO_2$$

Sulfur is used to manufacture sulfuric acid. It is used as a germicide to kill different types of insects and germs in agricultural areas. Large amounts of sulfur are used in the rubber industry, in the making of matches, and in preparation of chemical compounds.

Hydrogen sulfide occurs in volcanic gases, in a few oil wells, and in some natural mineral waters. It has the odor of rotten eggs and can be recognized very quickly by this characteristic smell. It can be prepared in the laboratory by adding hydrochloric acid to ferrous sulfides:

$$FeS + 2HCl = FeCl_2 + H_2S$$

Hydrogen sulfide, when dissolved in water, is a weak acid. The material is a colorless gas, liquefying at —61.6 degrees. At room temperature approximately three volumes of gas dissolve in one volume of water. It is poisonous and should not be breathed in large quantities. Hydrogen sulfide oxidizes in the air producing free sulfur. It can also be burned:

$$2H_2S + O_2 = 2H_2O + 2S$$

The sulfur which is liberated burns to produce sulfur dioxide as shown below:

$$S + O_2 = SO_2$$

Hydrogen sulfide is very important in qualitative and quantitative analysis as many of the metallic sulfides are insoluble.

$$CuSO_4 + H_2S = CuS\downarrow + H_2SO_4$$

This sulfide is black, as are most sulfides; however, zinc sulfide is white. Arsenic and cadium sulfide are yellow, while antimony sulfide is orange.

Sulfur dioxide is an oxide of sulfur. One of the best ways of preparing this material is to burn sulfur in air.

$$S + O_2 = SO_2$$

This material can also be prepared in the laboratory by allowing hydrochloric acid to react on sodium sulfite:

$$NA_2SO_3 + 2HCl = 2NaCl + H_2O + SO_2$$

Sulfur dioxide is a colorless gas having a very disagreeable odor. The gas can be liquefied rather easily and is soluble in water. One volume of water dissolves about forty volumes of gas at room temperature. Sulfur dioxide, when dissolved in water forms H_2SO_3 which is sulfurous acid.

Another important oxide of sulfur is sulfur trioxide which has the chem-

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— offer the quick efficient process for cleaning metals prior to finishing or plating. Prominent metal fabricators engaged in war work depend on PERMAG Compounds because of their unfailing service and economy. Write us about your cleaning problems. Our cooperative service can be of vital help to you in these demanding times.

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DU-LITE

WAR TIME TESTED FOR PEACE TIME USE . . .

Du-Lite has been successfully used for years. But unquestioned proof of its worth is to be found in its ability to stand up—to "take it" under the rough, tough conditions imposed by war. As used on arms, airplane and engine parts, tools and equipment, it has proven to be a durable, rust-resisting finish.

Du-Lite is widely used on bearing surfaces as an aid to lubrication. The Du-Lite processing smooths down microscopic roughness and produces an oxide film that holds oil. Extremely close tolerances can be maintained. Leading airplane and automotive engine manufacturers have found Du-Lite practical and efficient for this purpose.

Du-Lite will find many uses, both as an aid to lubrication and for protection, on many products after the war. If you are looking for help on black oxide finishing, call in the Du-Lite Engineer. His recommendations will not obligate you in any way, and may save you time, money and materials.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONNECTICUT

ical formula SO_3. This is important because of its production in the manufacture of sulfuric acid. However, the material is usually not isolated in this case, but it is known that the substance is formed in the manufacture of sulfuric acid.

Sulfuric acid is a very important chemical and many tons are used every year. There are two processes for manufacturing this compound. The first is the contact process which consists of burning the sulfur with oxygen to produce sulfur dioxide and then oxidizing this compound in the presence of a catalyst to sulfur trioxide. This material is then united with water to give sulfuric acid. Another method of making this material is the lead chamber process which oxidizes the sulfur dioxide to sulfur trioxide by means of nitrogen compounds. Each of these methods will be discussed below.

In the contact process the sulfur dioxide is obtained by burning sulfur with oxygen.

$$S + O_2 = SO_2$$

It is dried, heated, to 400 degrees, passed into a chamber along with oxygen where the two come in contact with a catalyst which is platinum, nickel, or other material. This gives the second product, SO_3.

$$2SO_2 + O_2 = 2SO_3$$

The sulfur trioxide thus produced is not taken directly to water to form sulfuric acid because a fog of small droplets of sulfuric acid in the gas is formed which becomes insoluble. This material would be swept away and lost. The sulfur trioxide can be absorbed readily in sulfuric acid, however. This material is then diluted and the sulfuric acid of desired strength is formed. The last equation can be represented as follows:

$$SO_3 + H_2O = H_2SO_4$$

In the chamber process nitrogen compounds such as nitrogen dioxide (NO_2) or nitric oxide (NO) act as the agents for oxidizing SO_2 to SO_3. Thus:

$$2SO_2 + 2NO_2 = 2SO_3 + 2NO$$

The NO produced can now be oxidized by the oxygen as follows:

$$2NO + O_2 = 2NO_2$$

The NO_2 thus formed can be utilized again to oxdize SO_2 to SO_3. These reactions take place at room temperature. The sulfur dioxide obtained is passed into large lead-lined chambers along with some vapor, air, and nitrogen compounds. After allowing a time for the gases to mix, the acid formed is dissolved in concentrated sulfuric acid. In order to recover the nitrogen compounds, the gases are washed with concentrated sulfuric acid. All the oxides of nitrogen are dissolved, forming nitrosyl sulfuric acid and all the oxides of nitrogen pass out as gases and are collected and utilized again. The reaction may be expressed as follows:

$$2H_2SO_4 + NO + NO_2 = 2H(NO)SO_4 + H_2O$$

$$2H(NO)SO_4 + H_2O = 2H_2SO_4 + NO + NO_2$$

The contact process is a more direct one, but the catalyst used is very easily poisoned and when poisoned does not produce sulfuric acid. For this reason the contact process must have pure starting materials. However, the contact process produces concentrated sulfuric acid. The chamber process does not have the catalytic poisoning property and therefore, the starting product can be impure. However, this produces impure sulfuric acid. The acid produced by the latter process is also diluted and cannot be obtained in the concentrated form. To summarize, the contact process is better for producing pure acid, while the chamber process produces cheaply an impure and dilute product which can be used in many industries without bad effect.

Sulfuric acid is a heavy material having a specific gravity of 1.84. The pure chemical is a colorless, oily liq-

WHICHEVER WAY YOU PAINT

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uid and, if heated, will decompose into sulfur trioxide and water. Sulfuric acid will dissolve in water in all proportions and for this reason is used as a drying agent. The material is a dibasic acid; that is, it yields two replaceable hydrogens. These hydrogens can be displaced one at a time, thus:

$$NaOH + H_2SO_4 = H_2O + NaHSO_4$$
$$NaHSO_4 + NaOH = 2H_2O + Na_2SO_4$$

Hot concentrated sulfuric acid is an oxidizing agent.

$$2H_2SO_4 + C = 2SO_2 + 2H_2O + CO_2$$

If metals low in the electromotive series—that is, metals that are inactive—are dissolved in sulfuric acid, sulfur dioxide is produced. Examples of these metals are copper, mercury and silver.

$$2H_2SO_4 + Cu = SO_3 + CuSO_4 + 2H_2O$$

On diluting sulfuric acid care must be taken to see that this process is carried out correctly as large amounts of heat are liberated when the material unites with water. If precautions are not taken steam will result, which will spray the hot sulfuric acid in every direction. Therefore, always pour concentrated sulfuric acid very gently and slowly into water; never the reverse.

When sulfuric acid has reacted with a metal until all the replaceable hydrogen has been displaced, the resulting products are known as sulfates. If one atom of hydrogen is left the salts are called acid sulfates or bisulfates. Examples of these are (1) sodium sulfate, Na_2SO_4, (2) sodium bisulfate or sodium acid sulfate, $NaHSO_4$. Most of the sulfates are soluble in water, the exceptions being calcium, barium and strontium. If a test for the sulfate radical is desired an insoluble compound is produced by adding a soluble calcium, barium or strontium salt to the solution containing the sulfate, and a white precipitate indicates the sulfate radical. Thus:

$$BaCl_2 + Na_2SO_4 = BaSO_4 + 2NaCl$$

Sulfuric acid is a very important material. It is used in the fertilizer industry for the manufacture of ammonium sulfate, for pickling iron and steel, in the treatment of many metals, and for the manufacture of explosives and textiles. In 1930, 7,625,000 tons were produced. The acid finds many uses in the metal-finishing trade. Whether it be pickling or plating baths, sulfuric acid is an important material for the plater.

When an oxide of any non-metal will combine with water to form an acid the material is called an acid anhydride. Thus:

$$H_2O + SO_2 = H_2SO_3$$
$$H_2O + CO_2 = H_2CO_3$$

Thus SO_2 and CO_2 are acid anhydrides. The oxide of any metal which unites with water to form a base is called a basic anhydride. Thus:

$$MgO + H_2O = Mg(OH)_2$$

Thus MgO is a basic anhydride. These are called acidic and basic oxides.

(Part 6 will be published in our March issue)

Acid Addition Agent. The Enthone Company has recently published a four-page bulletin in color describing their product "Acid Addition Agent," which is used in sulfuric, hydrochloric and other non-oxidizing pickles to promote better pickling. Advantages and use of the product are described in detail. For a copy of the bulletin write to The Enthone Company, Dept. PF, 442 Elm St., New Haven, Connecticut.

For a real good polishing job use

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KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

Rodine
Makes Pickling Efficient

This steel surface photograph (magnified) was pickled in an uninhibited acid bath. Note the deep pits, and that the surface is visibly crystalline.
This surface pictured was pickled exactly like the other except that RODINE was added to the acid solution. Only scale pockets and roll marks are visible; no pitting occurred.

Steel requires pickling to remove scale whether the fabrication is for steel plates for battleships, airplane parts, motor vehicle or ordnance parts.

Rodine in the pickling bath confines the acid action to removing the scale and inhibits acid action on the clean metal. This controlling action of Rodine in preventing the acid from dissolving clean steel, saves acid by eliminating a needless waste. The life of the pickle bath is increased and better pickling is accomplished.

Our technicians are available to adapt Rodine or other ACP Products to your individual production problems. Time will be saved if you will give us as complete details as possible concerning your methods and requirements.

Manufacturers of Inhibitors & Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP **PENNA.**

Note—West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 59th St., Los Angeles, California.

AMERICAN CHEMICAL PAINT COMPANY, AMBLER, PA.

Please send me general Technical Service Data Sheets on

Name_____ Title_____ ☐ *Rodine*

Company_____ ☐ *Pickle Bath Toner*

Address_____ A-2

Finishing Facts

Ferro Continuous Lacquer Baking Oven

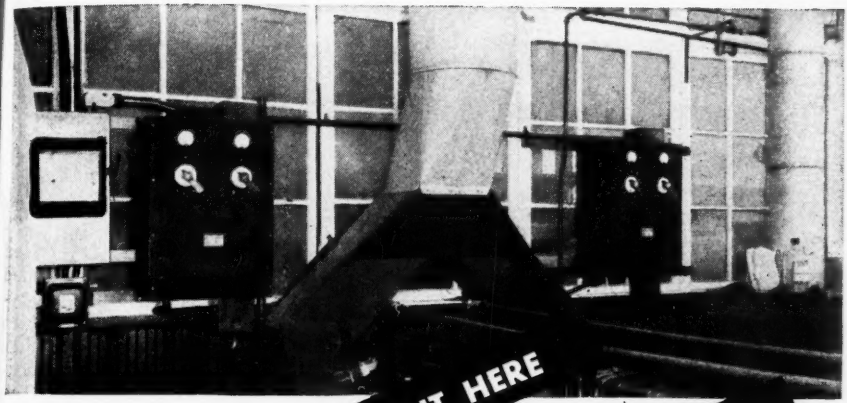
A RECENT installation of a continuous spindle conveyor type lacquer finishing oven is shown in the accompanying illustration. The oven, which was designed by the Ferro Enamel Corporation, Industrial Oven Division, Cleveland, Ohio, is installed in one of the leading ordnance plants.

The oven shell is built of unit steel insulating panels and encloses a continuous conveyor composed of equally spaced spindles to support long cylindrical shapes. These cylindrical workpieces are automatically sprayed with special lacquer both inside and outside as they rotate on the spindles.

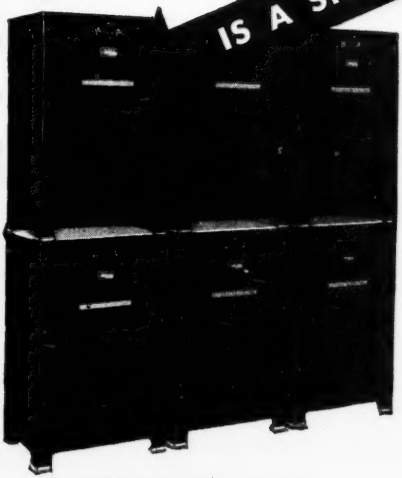
At the extreme right side of th illustration, the conveyor is shown entering the oven. The work is carrie along 110 feet of specially designe duct work to heat uniformly the vary ing thickness of the shapes and t hold closely to a varying temperatur gradient. This was one of the esser tial requirements in the design of th oven so that the thicker section would not be under-baked and th thinner sections over-baked through out the baking cycle.

In the center of the illustration th spindles can be seen emerging fron the oven. The work passes along a cooling bench where it is cooled from 300 degrees F. to a temperature a which the operator can remove th

Four hundred pieces per hour are automatically sprayed with special lacquer, both inside and outside, in this continuous lacquer baking oven.



TO VARY D-C OUTPUT HERE IS A SNAP FOR G-E RECTIFIERS



NO OTHER means of converting A-c to D-c for electroplating is as versatile . . . *as flexible in variety of D-c output at the tank* . . . as G-E Copper-Oxide Rectifiers. Examples: These six units can be regulated to give 0 to 1500 amps at 1 to 6 volts to each of two tanks shown; or any combination of capacity up to 3000 amps at 6 volts to one tank; or each unit may be used on separate jobs; or four may serve one job while two serve elsewhere; or any number of other combinations to meet changing D-c needs. For complete details: Section A-243-70, Tungar and Metallic Rectifier Div., General Electric Co., Bridgeport, Conn.

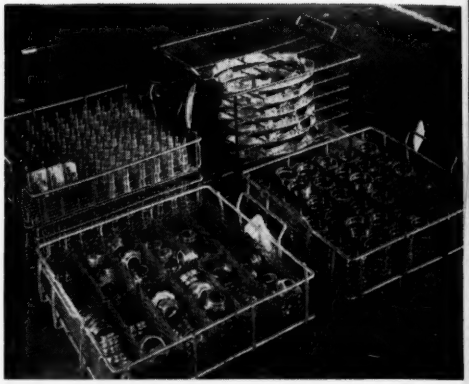
BUY WAR BONDS

GENERAL ELECTRIC

Hear the General Electric radio programs: The "G-E All-girl Orchestra" Sunday 10 p.m. EWT, NBC—"The World Today" news, every weekday 6:45 p.m. EWT, CBS.

pieces with his bare hands. Production rate of the oven is 400 pieces per hour.

The heat is supplied through a direct gas-fired air heater, and the oven temperature is held to very close limits by means of indicating and recording controllers. Complete safety equipment is provided to protect the oven against fuel or power failure or the malfunction of any element of the equipment.



These degreasing baskets have been lined with compar pads to protect the workpieces.

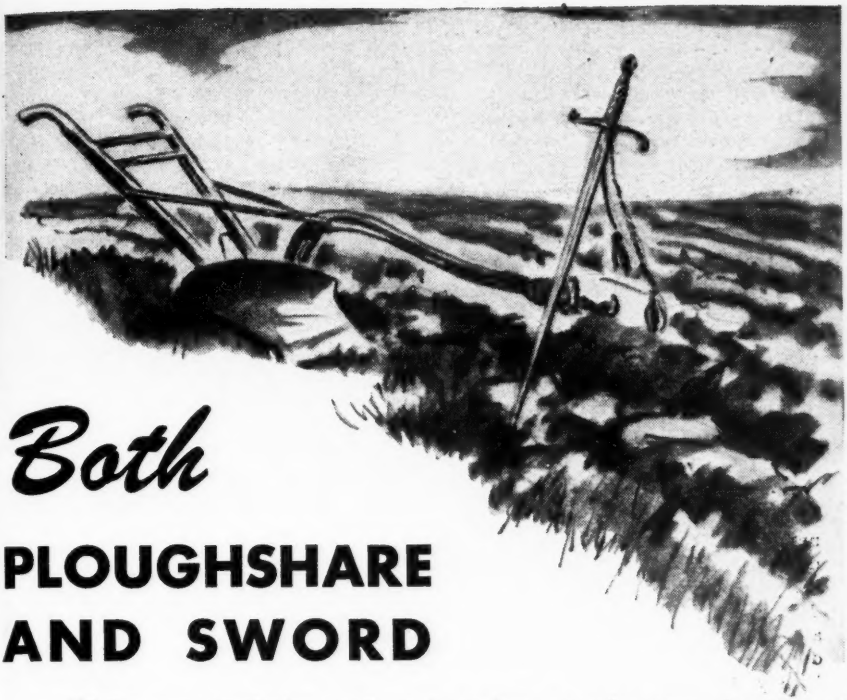
Protective Pads for Degreasing Baskets

A PROBLEM frequently encountered in industry is the breakage of castings with thin walls, fins and projections as a result of rough handling in degreasing baskets. A related difficulty is the scratching and corroding of highly polished machined parts through contact with degreasing basket surfaces.

A Packard workman is removing a wire degreasing basket from a tank of compar solution. The basket, which is purchased uncoated, is dipped in the compar solution twice and then run through a drying oven. The resulting coating is a tough, abrasion- and solvent-resistant film that will not injure the finely polished surfaces of airplane engine parts.

A recent solution is the development of a durable, solvent-proof, rubber-like pad to line degreasing baskets and provide castings and machined parts with a protective cushion while in the degreaser. Made of "compar" — a vinyl resin derivative compounded by Resistoflex Corporation, Belleville, N. J., the pads not only provide a cushioning effect but are also completely inert to the action of degreasing solvents, sulphur-base cutting oils, aromatic and aliphatic hydrocarbons, chlorinated hydrocarbons, and so on. The compar pads are said to have no harmful effect whatsoever on highly polished metal surfaces.

Smaller wire degreasing baskets which save the handling of parts may be coated with a solution of the same resin, which is easily applied by a simple dipping process.



Both

PLOUGHSHARE AND SWORD

Udylite war production equipment requires no major conversion to meet the demands of peacetime use.

True, metal finishing requirements will change. New cycles will be required. New products will demand new handling but through it all your basic metal finishing tools will not change—the faithful "swords" of war will become the "plowshares" of peace.

Udylite metal finishing equipment has proved its worth under the strain of wartime performance, the same engineering and dependable quality which enabled it to withstand the rigors of forced production will make Udylite equipment doubly valuable in normal times.

Udylite's staff of experienced engineers offer you the country's most complete line of dependable polishing, plating and anodizing equipment backed by their years of technical "know how". Start RIGHT with Udylite equipment.

Call or write Udylite for your Metal Finishing requirements.

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11-15 44th Drive

Cleveland 3
4408 Carnegie Ave.

B.C.F. Addition Agent

LESS than one ounce of a new chemical per gallon of copper electroplating solution reduces by one-third the copper required for electrotype printing plates and cuts in half the scrap resulting from manufacture of these plates, according to a recent announcement of the Electroplating Division of E. I. du Pont de Nemours & Company. It is claimed that the chemical so increases the hardness of the copper deposit that a much thinner layer will give equal service. It allows a pound of copper to cover one-third more square inches of surface. It also assures a smooth finish and speeds the plating of the electrotypes.

The agent is said to eliminate inferior plating on the edges and corners of the printing plates. This permits a reduction in the width of the "safety bearers" and accounts for reducing to half the copper scrap usually resulting from electrotype production. The chemical is especially timely for electrotypers. They formerly used about 2,200 tons of copper anodes annually and their supplies have been drastically cut during the war.

Treatment of Aluminum and Aluminum Alloys

IT has recently been established that the appearance as well as the effectiveness of Alrok coatings can be improved by the use of Deoxidine, a phosphoric acid type cleaner. Deoxidine No. 170 for immersion processes and Deoxidine No. 10E for spray operations are used in water solutions in accordance with regular metal cleaning practice.

Aluminum oxidizes rapidly but, unlike steel, the resultant oxide forms a protective coating that retards further corrosion. In the Alrok process, a uniform oxide coating is developed chemically, which both protects the metal and changes and improves its appearance. The object and benefit of the Alrok process is to obtain uniformity of the oxide coating. In order to obtain this, it is absolutely necessary to have a pre-cleaning system that will present uniform, chemically clean and receptive surfaces to the oxide-forming baths.

The Deoxidine process in preparation for Alroking combines the cleaning and eaching operations in one solution, thus reducing the time required and increasing the production capacity of the finishing department. The cleaning and the uniform etching is effectively accomplished without objectionable or corrosive fumes and after a water rinse, the parts take a uniform and durable Alrok coating. The trace residues of the Deoxidine process (phosphates, if left) are anti-corrosive agents that improve rather than impair the life of paint finishes subsequently applied.

The success of Deoxidine for cleaning aluminum and aluminum alloys is but one example of the successful use of Deoxidine for cleaning metals (except zinc and cadmium) in properly preparing them for paint. The thorough cleaning is chemical as well as mechanical and residues, if left, are beneficial to paint life rather than harmful. There are various grades of Deoxidine adapted to the various methods of application and different conditions of the surface. Deoxidine is a product of American Chemical Paint Company, Ambler, Pennsylvania.

Hard-Drying Rust-Inhibiting Waxes. A four-page bulletin in color has been issued by The Enthone Company describing emulsion waxes available to the metal-treating industry. These waxes are applied at room temperature and form adherent, hard, rust-inhibiting films upon the metal. For a copy of the bulletin write to The Enthone Company, Dept. PF, 442 Elm St., New Haven, Connecticut.

THE NEEDS OF INDUSTRY

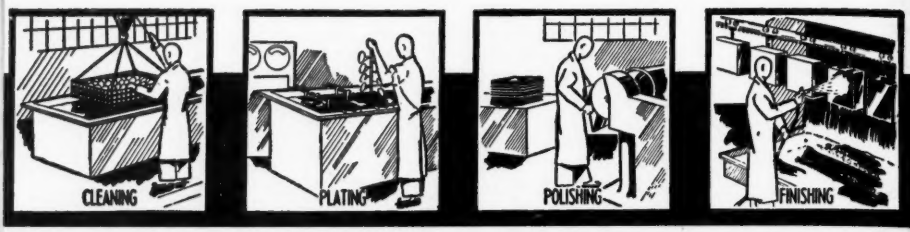
As industry approaches the peace it becomes apparent that chemistry must be a working partner of conversion. New problems, new products, new techniques . . . all demand its helping hand.

Chemical coatings are doing more than meet the peace-time needs of industry. They are creating industry . . . molding industry . . . changing the entire course of production. In test tubes fired by war thousands of new products, new processes and new profits have been born.

Chemical research in the coating field is helping to win the war . . . is laying the foundation for a post-war prosperity of tremendous proportions. How this research affects your business should be investigated carefully in your program of post-war planning. Your inquiry will incur no obligation.

Address The Stanley Chemical Company . . . manufacturers of Stanley lacquers, synthetics, enamels and japans . . . East Berlin, Connecticut.

Stanley Chemical



News of the Industry

Changes in Carborundum Personnel

Officials of The Carborundum Company, Niagara Falls, N. Y., announce several changes and appointments in the personnel of the Carborundum sales organization. E. R. Baxter has been appointed as assistant to the vice president in charge of sales, Mr. Charles Knupfer. John F. Claydon, formerly an industrial salesman in the Boston territory, has been appointed district sales manager at Boston. He will succeed Fred W. Bonacker, who has been assigned to special sales work reporting to sales executives at the main office of the company at Niagara Falls. A. A. Murfey has been appointed as district sales manager at Cleveland and will head the Carborundum district sales staff and warehouse in that city.

Proven Named General Sales Manager for Sterling Tool

S. A. Crosby, president of the Sterling Tool Products Company, Chicago, Ill., announces the appointment of J. A. Proven as general sales manager. Mr. Proven was formerly with the Victor Adding Machine Company, holding the positions of service manager, liason engineer, assistant sales manager, and most recently, western regional manager in the company's Los Angeles office. He has had considerable experience in the development and promotion of mechanical products.

In his new position with Sterling Tool Products Company, Mr. Proven will take charge of an expanded sales and advertising program that will feature the Sterling 1000, a portable electric sander that has been specially developed for production sanding.

Meacham Joins Chicago-Vit Staff

A recent announcement from the Chicago Vitreous Enamel Product Company, Cicero, Ill., tells of the appointment of F. L. Meacham as manager of sales and service. Mr. Meacham was formerly

F. L. Meccham

research chemist and metallurgical assistant at the American Rolling Mill Company, Middletown, Ohio, during which time he pioneered and developed sheet metal for the application of porcelain enamel. More recently he has been with the Frigidaire Division of General

Motors where he held various offices, the last of which was manager of the War Production Engineering Division, in full charge of all engineering problems in connection with the production of war items manufactured by Frigidaire.

Cordo Chemical Corp.

The Corrosion Control Corporation Norwalk, Conn., has changed its corporate name to Cordo Chemical Corp., as of January 1, 1944. When manufacturing and marketing its original product, Co-Res-Co, a plastic corrosion-resistant coating, the name was quite suitable. Today it is not, for this firm is now offering industrial coatings, finishes, lacquers and bonding adhesives. With the exception of Co-Res-Co, they are all now being marketed under the trade name "Cordo."

American Foundry Equipment Wins White Star

For continued meritorious service on the production front, the American Foundry Equipment Company, Mishawaka, Ind., has been awarded the White Star to be added to its Army-Navy "E" Production Award flag originally awarded on March 20, 1943.

Notification of this honor was received in a letter from Robert P. Patterson, Under Secretary of War. In his notification letter, Mr. Patterson cited the men and women of American Foundry Equipment Company for maintaining their high production standard and explained that the White Star is "the symbol of appreciation from our Armed Forces for continued and determined effort and patriotism."

Authority on Metal Finishing Joins MacDermid

MacDermid Incorporated, Waterbury, Conn., announces the appointment of Arthur Logozzo as a technical service engineer. Mr. Logozzo brings to this organization a broad knowledge of the metal finishing and plating industry. He is recognized as a leading authority on hard chrome plating and has addressed many of the various technical societies on this subject.

Mr. Logozzo won first prize for an exhibit of chrome-plated dies and molds at the 1941 A.E.S. Convention. He also won the General Coffin Award in 1942 for unusual and persistent effort in developing a new and efficient method of chrome plating molds. Articles written by Mr. Logozzo have appeared in many of the industrial magazines.

Mr. Logozzo's talents are available to all New England manufacturers for the installation of plating equipment or for the servicing of existing equipment and plating processes.

Kress Assigned to Pennsalt Chicago Office

Robert W. Kress, formerly with the research department of the Follansbee Steel Corporation, Pittsburgh, Pa., who joined the Special Chemicals Division of the Pennsylvania Salt Manufacturing Company last November, has been assigned to the Chicago office of that company, according to an announcement by William P. Drake, manager of sales.

Mr. Kress will assist J. W. Manz in handling sales-service work on Pennsalt cleaners, corrosion-resistant cements, Pennsalt LF 42 (lead fluoborate concentrate) and other products of the Special Chemicals Division in the Chicago territory.

Norton Appoints Westerholm

George E. Westerholm has been appointed an abrasive engineer for the Milwaukee territory by Norton Company, Worcester, Mass., where he will assist F. W. Grant. Mr. Westerholm, who has been with Norton Company for 21 years, was formerly connected with the research laboratories and more recently specialized as field engineer serving steel mills and foundries.

Milton Kutz Rejoins Du Pont

Appointment of Milton Kutz as acting assistant general manager of the Electrochemicals Department of E. I. du Pont de Nemours & Company was announced recently by Frank S. MacGreagor, general manager of the department. The appointment marks the return of Mr. Kutz to the post which ill health forced him to relinquish 18 months ago for a term of less active service.

Born at Logansport, Ind., Mr. Kutz was educated in the public schools of New York. He joined the Roessler and

Hasslacher Chemical Company in 1897, rising during 33 years of service to vice president and a director of the firm. Upon the merger of that company with Du Pont in 1930, Mr. Kutz became director of sales. When the company was established as the R. & H. Chemicals Department in 1933, he was named assistant general manager of the new department.

Ault Returns to American-Marietta

Harry Ault, who was advertising manager of the American-Marietta Company several years ago, has returned to assume the post of sales promotion manager, it was announced recently by Grover M. Hermann, president. Mr. Ault, formerly with the Lehon Company, replaces Bob Ornberg, who has been inducted into the U. S. Army.

Westinghouse Names Product Design Manager

Ralph E. Kruck, who has designed everything from baby carriages to refrigerators, has been appointed manager

Ralph E. Kruck

of the Product Design Department of the Westinghouse Electric Appliance Division. An industrial designer for Westinghouse since 1931, Mr. Kruck will have the job of "appearance-designing" electric ranges, automatic laundering machines and all other appliances the company builds after the war. His headquarters will be at the company's plant in Mansfield, Ohio, working closely with the engineering, sales and advertising departments.

Appointed to take Mr. Kruck's place at the Westinghouse plant in East Springfield was Anthony Naiden, a design engineer who has been associated for the past eight years with advertising agencies of New York.

Division of Pennsalt Territory

George M. Beitzel, vice president in charge of sales of the Pennsylvania Salt Manufacturing Company, Philadelphia, Pa., announces that the company has divided the New York territory as follows:

F. G. Rodenburgh will cover New York City, Long Island, Westchester and Putnam counties in New York, and Fairfield, New Haven and Middlesex counties in Connecticut.

Charles A. McCloskey will cover Northern New Jersey as heretofore and, in addition, will cover Connecticut and the eastern half of New York state with the exception of the counties in those states covered by Mr. Rodenburgh.

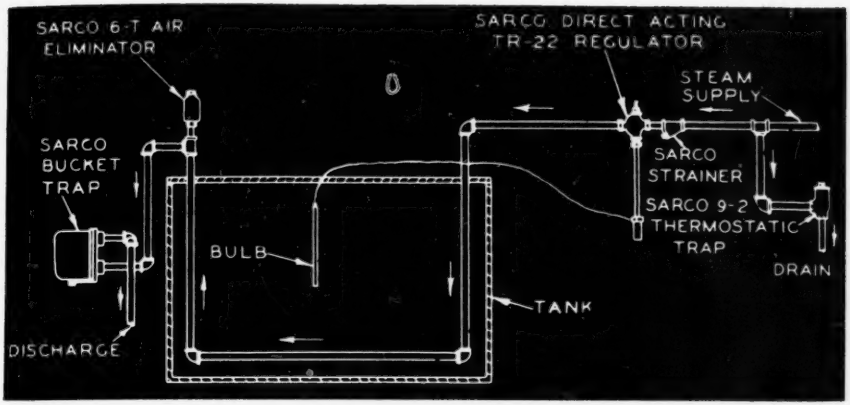
Both Mr. Rodenburgh and Mr. McCloskey, who are representatives for the company's line of chlorine, caustic soda, and other heavy chemicals, will maintain their headquarters at the company's New York office.

Talks on Contracts Relating to Patents and Engineering

Two talks on the subject, "Contracts Relating to Patents and Engineering," were given by Anthony William Deller, noted patent attorney and member of the New York Bar, at the School of Engineering of Columbia University, New York City, on Monday and Wednesday, January 10th and 12th. Mr. Deller is patent counsel for the International Nickel Company and is author of many publications in the field of patent law, including such books as "Patent Law for the Chemical and Metallurgical Industries" and Deller's Edition of "Walker on Patents."

Henry E. Miller

Henry E. Miller, president of the Chicago Wheel & Manufacturing Co., died in Chicago on Monday, January 10th, af-

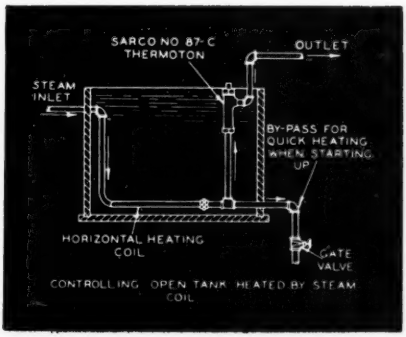


How exact should plating control be?

Above we show a job which called for extreme exactness and reliability of tank temperatures. It is held within a degree — is protected against air binding, foreign material in the lines, and against needless waste of heat.

Below is an example of the most inexpensive tank control, which acts as both a steam trap and a regulator and holds within a few degrees.

If you need both heating and cooling for chromium or other processes, Sarco Electric Controls will do the trick.



The nearest Sarco representative can select the lowest cost combination to give the results you want on every process in your shop. Ask for the catalogs on plating control.

26

SARCO COMPANY, INC.

475 FIFTH AVENUE

NEW YORK 17, N. Y.

SARCO CANADA LTD., 85 Richmond St., W, TORONTO, ONT.

ter a brief illness. Mr. Miller was born in 1863 on an Illinois farm, became an expert machinist, then traveling salesman for the Minnesota Thresher Company. In 1894 he was made manager of the Chicago Emery Wheel Company, which he later purchased. In 1895 he became president and changed the firm's name to Chicago Wheel & Manufacturing Co. Mr. Miller was one of the founders of the Grinding Wheel Manufacturers Association.

Mr. Miller's son, Arthur J. Miller, has been identified with his father in business for many years and will continue to direct the affairs of the company with the same associates—Irving Danielson, vice president, and Arthur T. Dalton, executive secretary and director of sales.

Winton Joins Mid-West Abrasive

Glenn E. Winton, former chief field quality engineer for the Minnesota Mining Company, has joined the technical staff of the Mid-West Abrasive Company, Detroit, Mich., as quality engineer in the coated abrasive division, James T. Jackson, Mid-West president, announced recently. Mr. Winton comes to Mid-West with a background of 16 years experience in the abrasive field, eight of which were spent in the laboratory.

Lemperly Appointed Sherwin-Williams Vice President

According to an announcement made by George A. Martin, Chairman of the Board of The Sherwin-Williams Co., the directors have elected Charles M. Lemperly to the office of vice president. In April, 1943, Mr. Lemperly was appointed director of sales and distribution in which capacity he will continue to manage all Sherwin-Williams sales activities.

As vice president and director of sales, he will supervise all of the company's publicity, advertising and public relations. Mr. Lemperly has been actively identified with all the company's sales plans and campaigns. He is well known in the paint industry and is one of the originators of the "Save the Surface" campaign.

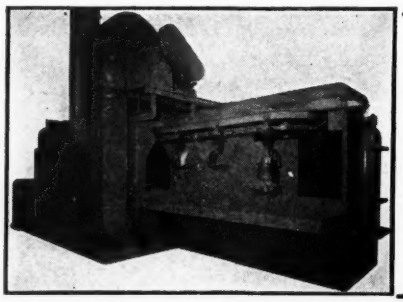
Crane Equipment and Supply Company

The A.B.C. Chemical Company, Waterbury, Conn., announces the change of the firm name to the Crane Equipment and Supply Company. The change has been made to identify better the products that the firm now distributes and to fit in better with the company's postwar plans. The Crane Equipment and Supply Company is the distributor of a number of products used in the metal-finishing field.

New Sales Manager for Floquil Products

Robert E. Wright, formerly sales engineer for the American Marietta Company, Chicago, Ill., has been appointed sales manager of Floquil Products, Inc., New York City. Floquil Products manufacture waterproof and weatherproof marking colors and marking devices suitable for all kinds of surfaces and now being used in industrial plants and shipping departments.

Mr. Wright was well known in the industrial trade in New York state and brings to Floquil Products the wide knowledge and experience acquired in that field.



HYDRO-FLOW
INDUSTRIAL WASHING MACHINES

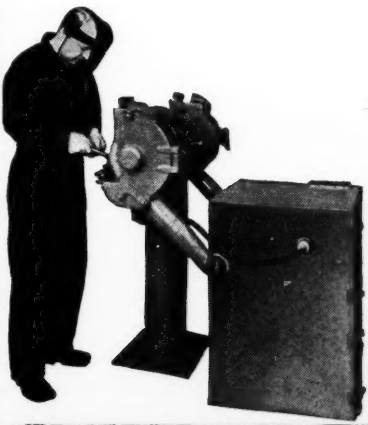
Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

INTERNATIONAL CONVEYOR & WASHER CORP.
Write for circular.
640 E. FORT ST. **DETROIT, MICH.**

IT'S NO TRICK AT ALL WITH TORIT

TORIT DUST COLLECTORS

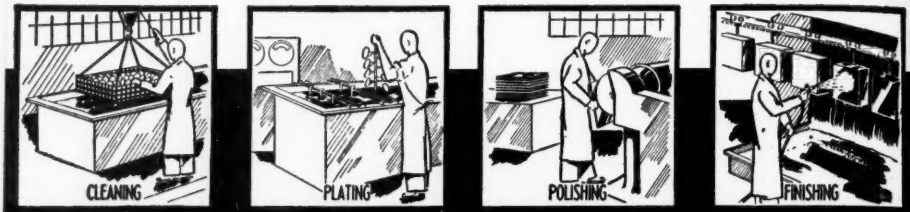
This "cutting" job raises no dust but in industrial cutting, grinding and polishing operations dust is a menace, endangering employes' health and valuable machinery.



TORIT Dust Collectors trap this dust at its source. Portable, and completely self-contained, they fit into present production layouts and can be easily moved to meet new conditions as they arise. For complete information write:

TORIT MANUFACTURING CO.
314 Walnut St. St. Paul 2, Minn.

TORIT Dust Collectors
SELF-CONTAINED UNITS



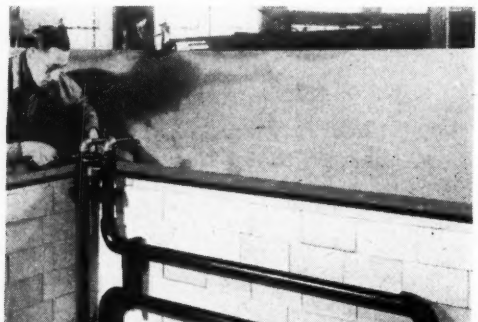
New Equipment and Materials

Heil Graphitic Carbon Heating Coil

A graphitic carbon heating coil, which has proved effective for heating tanks containing acid cleaners used to prepare aluminum aircraft parts for spot welding, has been developed by the Heil Engineering Company, 12901 Elmwood Ave., Cleveland, Ohio. The coil, which is made in standard sizes and in any shape for a wide variety of uses, is said to be impervious to chemical action, is entirely non-metallic, and has a heat conductivity between that of steel and copper.

It can be used for heating pickling, electroplating and metal etching baths, and is particularly effective for muriatic pickling and other chloride processes which require heating. It is unattacked by many of the chemicals.

The coils are supplied for simple heating of solutions, and steam jets of the same material are supplied for direct introduction of steam to perform both heating and agitation. Other heating equipment of the same material includes bayonet-type heaters, nozzles, heater sheaths, and electric immersion heaters. Steam coils usually operate with pressures up to 50 lb. per square inch.



Heil Graphitic Carbon Heating Coil

Iridite

Rheem Research Products, Inc., 2523 Pennsylvania Ave., Baltimore 17, Md., has introduced a process which protects zinc or cadmium surfaces from corrosion by creating a coating, integral with the metal, which cannot chip or flake off. The coating is caused by a chemical reaction with the plated metal itself and is uniform and opaque. Formerly available in only the olive drab color used by the armed forces, Iridite Black is now available for commercial use. Iridite Black is not a black oxide, but an exact duplication of the Olive Drab Iridite in everything but color.

Iridite does not alter the dimensions of a part. Delicately machined and closely articulated pieces can be protected by Iridite without affecting their use or operation. It is claimed that parts which have been coated with Iridite can be bent, twisted or formed without chipping, flaking or affecting the protective qualities of the coating.

Parts are protected by the Iridite process by simply dipping them in the Iridite solution from 10 to 60 seconds and rinsing in hot water immediately afterwards. Hot water is preferred in order to facilitate drying. The drying may be done by compressed air or by whatever other means are available. As soon as the part is dry, it can be handled and shipped.

The only equipment needed consists of an acid-proof container for the Iridite solution and a container for the hot water rinse. The Iridite solution is used at a temperature of from 75 to 100 deg. F., depending on the nature of the articles to be shipped and the number of pieces to be dipped together. The process can be applied to parts of any type or size, except containers for edible products.

Enthone Cleaner 100

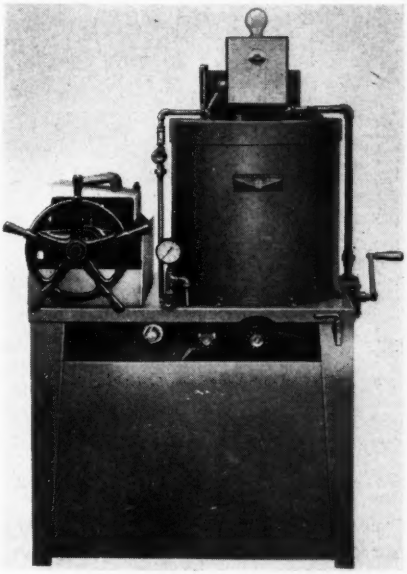
The Enthone Company, 442 Elm St., New Haven, Conn., has announced the development of an alkali material for cleaning steel, to be known as "Cleaner 100." The product is used in a concentration from 4 to 8 oz. per gal. in the temperature range from 180 to 212 deg. F. It is said to have high detergency and was especially designed for the cleaning of steel. It is best used anodically, but it is also claimed to be an effective immersion cleaner.

Advantages claimed for the product include excellent rinsability and long life due to buffering and selection of surface active materials. Cleaner 100 contains no soap such as rosin soap, but contains complex phosphates to solubilize any fatty acid soap that may form from greases and oils being cleaned. The cleaner is effective in soft and very hard water and does not form insoluble residues due to reaction with acids.

YM Model A-8 Oil Reclaimer

Especially designed for small plants, a lubricating oil reclaiming unit with capacity for purifying eight gallons of dirty oil in 70 to 90 minutes is now being manufactured by the Youngstown Miller Co., Sandusky, Ohio. Designated as the Model A-8, the unit includes a two-stage filter press, is semi-automatic, operating under thermostatic control, and utilizes ordinary refinery earths.

For handling larger quantities of lubricating or hydraulic oils, the reclaimer is



YM Model A-8 Oil Reclaimer

available in seven other sizes, each of which is said to restore used oil to substantially the same values of fire, flash, viscosity, color, neutralization number, and precipitation number as the new parent oils. According to the manufacturer, the units are now being used to reclaim oils from Diesel and gasoline engines, hydraulic machines, vacuum pumps and other equipment.

Pure Water for Electroplating

A process has been developed for the purification of water to replace distilled water, at a fraction of the cost. It is claimed that this process will produce "de-ionized" water fit for any chemical or industrial purposes. It is a development of the Illinois Water Treatment Company.

There has never been a time when the

In 1943...

57% OF OUR BUSINESS

HAS REPEAT BUSINESS!

PROOF THAT

HOWARD METAL CLEANING

AND FINISHING MACHINERY

...does the job!

No testimony could be more convincing. Leading plants (names on request) find HOWARD machinery meets perfectly every cleaning and finishing requirement . . . some re-ordering for the SIXTH TIME IN ONE YEAR. Consult HOWARD — our engineers will gladly offer recommendations on costs, methods, machinery . . . without obligation.

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Latest data on metal cleaning and finishing machinery.

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HOWARD *Engineering & Mfg. Co.*

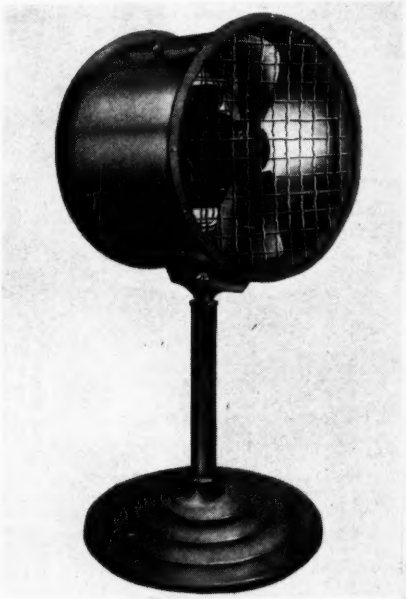
1056 HULBERT CINCINNATI 14, OHIO

electroplating and metal-finishing industry has been more conscious of the need for pure water. It is now known that many formerly mysterious troubles in the plating plant were caused by impure water. De-ionized water, which contains from two to ten parts per million of dissolved solids and is comparable to single-distilled water, is said to be eminently suitable for electroplating operations.

The Hanson-Van Winkle-Munning Co., Matawan, N. J., has been appointed sales representative for this process in the metal-finishing industry, and is prepared to furnish full preliminary information to manufacturers operating electroplating plants who are interested in the process.

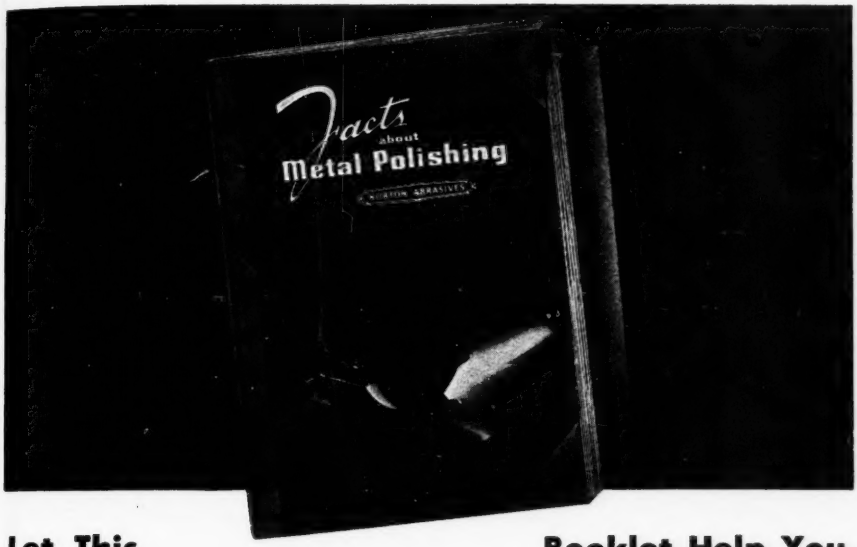
"Air Blaster" Fan

A fan, designated as the "Air Blaster," which delivers a large volume of air in a straight line to the spot where



"Air Blaster" Fan

it is needed, has been placed on the market by Chelsea Fan & Blower Co., Inc., 1206 Grove St., Irvington, N. J. The air is said to reach out-of-the-way cor-



Let This Booklet Help You
Get More Service from Your Polishing Abrasive

IT'S just what the name implies — "Facts about Metal Polishing," 39 pages of useful information. Typical chapter subjects are: Preparation of Glue, Types of Polishing Wheels, Setting Up Polishing Wheels, Setting Up Abrasive Belts, Correct Drying, Factors of Efficient Polishing.

Today, when it's absolutely necessary to get maximum service from your abrasive, this booklet is doubly valuable. Write for a copy today—no charge nor obligation. Just ask for Form 1340MP.

NORTON COMPANY, WORCESTER, MASS.

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NORTON ABRASIVES

SPECIFICATIONS!

✚

PLUS

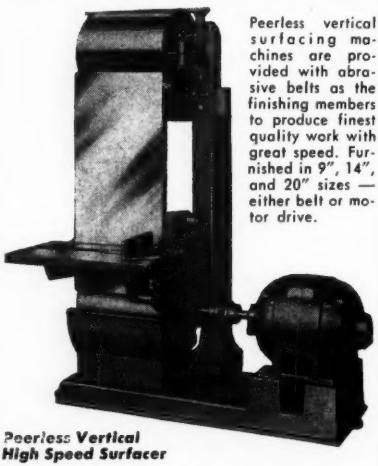
Adaptation of formulae to the individual requirements of busy war contractors.

Within specification limits there are many possibilities of improvement in speed, workability, and freedom from rejects.

This PLUS factor is worth considering. We'd like to tell you more about it.

The Varnish Products Co.
Cleveland, Ohio

HIGH SPEED SURFACING



Peerless vertical surfacing machines are provided with abrasive belts as the finishing members to produce finest quality work with great speed. Furnished in 9", 14", and 20" sizes — either belt or motor drive.

Peerless ***Vertical High Speed Surfacer***

PRODUCTION MACHINE CO.
GREENFIELD • MASS.

ners and dead air spaces. The discharge expands only slightly and continues as a high velocity air stream over large distances.

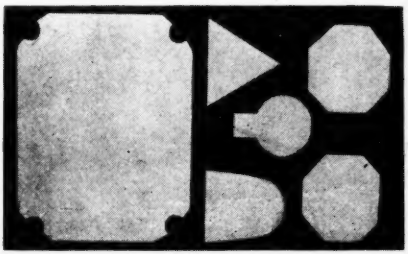
The unit consists of a heavy gauge welded steel housing, mounted on an adjustable pedestal which may be tilted 60 deg. up or down. It is driven by a direct-connected, ball bearing motor. The fan blade is of heavy steel, die cut, die formed and perfectly balanced.

The Air Blaster is made in three sizes: 18-in., ¾ h.p., 6,000 c.f.m. motor; 24-in., 1½ h.p., 9,000 c.f.m. motor, and 30-in., 1½ h.p., 11,000 c.f.m. motor.

Kum-Kleen Stickers

Avery Adhesives, 451 E. Third St., Los Angeles 13, Calif., announce that they have developed a method of making masking stickers cut to the size and shape specified by the customer.

Kum-Kleen stickers are said to be



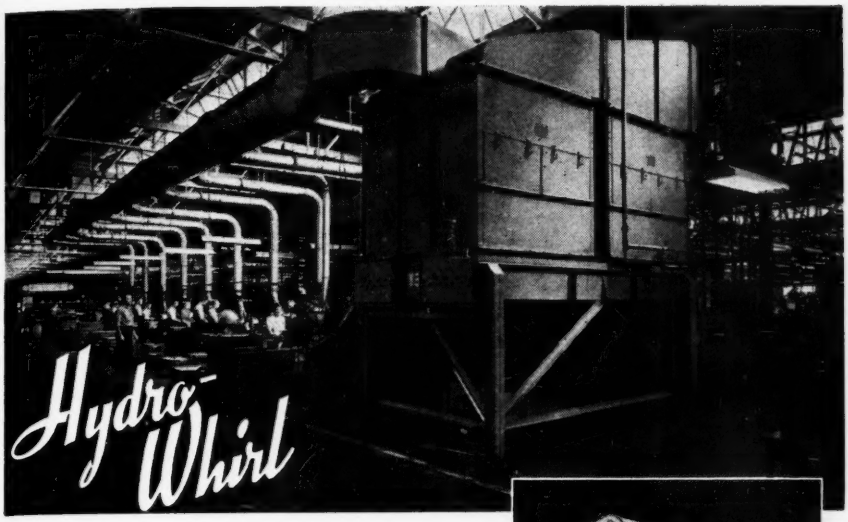
Special Size Kum-Kleen Stickers

easy to handle because they are applied without moistening and peel off without scraping or tearing. These precut masking stickers eliminate the necessity of masks being hand cut by the operator and, it is claimed, experience has shown that they have increased the speed of masking operations, particularly in covering smaller areas.

H-VW-M Zinc Plating Solution

Interest in zinc is now tremendous as it is being substituted for cadmium coatings on many articles that must be protected against corrosion. Several different types of solutions are available, each type having its particular application.

A special alkaline solution has been developed by the Hanson-Van Winkle-

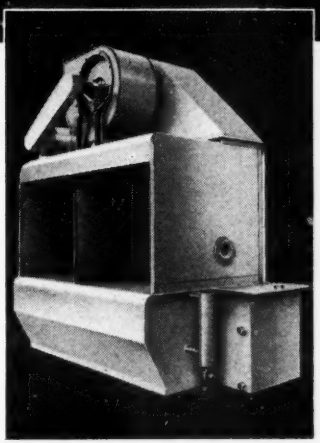


MAKES FOR GREATER

Plant Efficiency

Whatever your requirements in dust collecting units, ventilating systems, ovens, paint spray booths, etc., Peters-Dalton, Inc. engineers—through long and varied experience—can solve the particular problems pertinent to your plant. Shown here are typical installations of Peters-Dalton, Inc. equipment designed and built to successfully meet dust control problems in all types of organizations. Feel free to call upon us—our wealth of experience, recommendations and fullest assistance are yours for the asking.

Peters-Dalton, Inc. Hydro-Whirl Collectors are accepted standard for magnesium dust collecting.



● (Top) A Peters-Dalton, Inc. installation in large department devoted to double spindle grinding and polishing lathes. In foreground is a 28,000 C. F. M. Hydro-Whirl unit.

● (Lower) Booth type Hydro-Whirl collector suited for flexible shaft grinding and burring operations. Center divider removable, making full-width single booth if desired.

HYDRO WHIRL

PETERS-DALTON *Incorporated*

630 EAST FOREST AVE. • DETROIT 1, MICH.

(Formerly Industrial Sheet Metal Works)

MFRS. HYDRO-WHIRL DUST COLLECTORS AND SPRAY BOOTHS—INDUSTRIAL OVENS, MECHANICAL WASHERS AND VENTILATING SYSTEMS

Munning Co., Matawan, N. J., with which is used S-B Addition Agent for producing satin-bright to bright deposits, the degree of lustre depending on the choice of operating conditions.

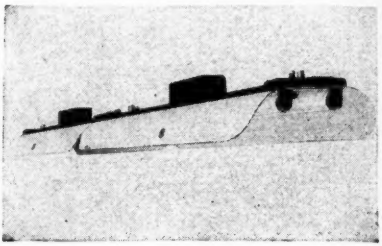
In unagitated solutions the cathode current density range is from 10-45 amps. /sq. ft. Maximum brightness is obtained with the solution temperature maintained at 70-75 deg. F. The deposits are somewhat lustrous as they are taken from the plating bath. A satin-bright to full-bright finish is produced by dipping the work momentarily in a ½ per cent nitric acid solution.

The addition agent used in the S-B solution is said to have extremely long life. Additions are not required until the solution has operated from one to three months, the frequency depending upon the amount of drag-out. Zinc-aluminum anodes are recommended in the S-B solution.

S-B deposits can be heat relieved, blackened, given phosphate coatings or any of the chromate film treatments. The deposits can also be soldered without difficulty. The deposits are unalloyed zinc, giving excellent protective value. The lustrous, silvery coating can be subjected to forming, bending or drawing operations without rupturing or lifting.

Westinghouse Double-Reflector Luminaire

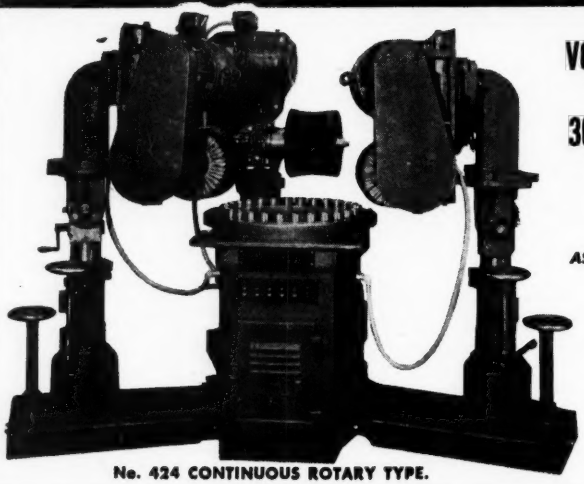
Designed for easy continuous strip installation, a light-weight fluorescent Luminaire with one-piece, double-length hood and two full-size reflectors has been announced by Westinghouse Elec-



Westinghouse Type F N C Double-Reflector Luminaire

tric & Manufacturing Company, Lighting Division, Edgewater Park, Cleveland, Ohio. Available for use with four or six 40-watt or four 100-watt Mazda F lamps, the Type F N C luminaire is said to be the equivalent of two conventional

Packer-Matic



No. 424 CONTINUOUS ROTARY TYPE.

VOLUME PRODUCTION AS HIGH AS 3000 PIECES PER HR.

Send Details and Samples of Parts.

ASK FOR BULLETIN No. 15.

The Packer Machine Co.

DEPT. PF.

MERIDEN, CONN.

• At Your Service •

how's YOUR quota?

YOUR 4th WAR LOAN QUOTA

IF you haven't already got a smooth running, hard hitting War Loan Organization at work in your plant, there's not a minute to lose.

To meet your plant's quota means that you'll have to hold your present Pay-Roll Deduction Plan payments at their all-time high—plus such additional amount as your local War Finance Committee has assigned to you. In most cases this will mean the sale of *at least* one $100 bond per worker. It means having a fast-cracking sales organization, geared to reach personally and effectively every individual in your plant. And it means hammering right along until you've reached a 10% record in those *extra* $100—or better—bonds!

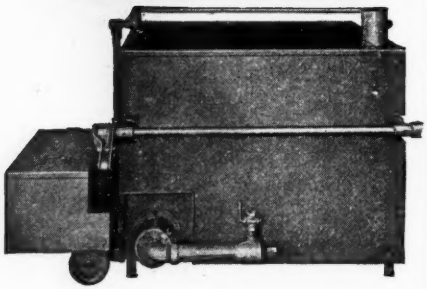
So common are the cases of two, three, or even more, wage-earners in a single family, that you'll do well to forget having ever heard of '10%' as a reasonable investment. Why, for thousands of these 'multiple-income' families 10% or 15% represents but a paltry fraction of an investment which should be running at 25%, 50%, or more!

LET'S ALL BACK THE ATTACK

This Space Contributed to Victory by
PRODUCTS FINISHING

This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council

METAL PARTS CLEANING
Low Cost -- Efficient



"STURDY-BILT" *Simplex*
METAL PARTS CLEANER

A small compact, mechanically simple unit combining ACTIVE-SOAK with WASHING ACTION. Removes oil, grease, chips from metal parts, assemblies castings, etc.

Operator simply loads tray — presses a switch and the "Simplex" does the rest. Can be installed individually in different departments or in a series for consecutive steps of cleaning, rinsing, coating or treating.

NOW . . . S-B DRYERS for complete installations of cleaning and drying parts.

Write for Complete Information

STURDY - BILT EQUIPMENT CORP.
DEPT. P-2 **WEST ALLIS, WISCONSIN**

Also manufacturers of "Sturdy-Bilt" Soaker-Hydro continuous production and parts cleaners.

units. The hood is fabricated from sheet steel with all ballasts, lamp holders and starter sockets mounted and wired as part of the channel assembly. New sliding hangers permit suspension from any part of the hood. Mounting arrangements are available for any application.

The moisture-resistant, non-metallic reflectors are covered with a multi-coat polymerized finish which provides a reflection factor of 85 per cent or more. Winglock permits easy removal of reflectors for cleaning.

Running Gear Hydrocarbon Cleaner

An emulsifiable type cleaner, designed for quick removal of oils and solid particle dirts and greases, especially those which are hard and caked on, has been developed by Technical Processes Division, Colonial Alloys Company, Colonial Philadelphia Bldg., Philadelphia 34, Pa. The manufacturer claims that it is an ideal cleaner for metals in general, road and mining machinery, tractors, tank chassis, gun mounts, large machines, and parts and assemblies, prior to repairs or refinishing.

Running Gear cleans smut on steels, polishing, buffing, drawing, stamping compounds, and many slushing oils.

Where the metal is to be Bonderized, Running Gear is said to be well considered, for it does not passivate the metal surfaces. It may be used as a solvent either in an open tank or in a degreasing machine, to be followed by an alkaline dip for purposes of plating, anodizing, and so on. It is claimed that many applications which will not respond to alkaline cleaning are handled satisfactorily with Running Gear, with the added advantage that it is not harmful to any of the metals. When used alone without a subsequent water bath, it will efficiently remove thin oil and grease films.

Running Gear is recommended for use at room temperature; the work is sprayed or dipped into a tank of the solution. Depending on the severity of the cleaning job, a soak period of from ½ minute to 30 minutes is advised. The solution is allowed to drain off the work and then is flushed off with a pressure hose or a water dip (preferably hot water or steam for faster drying).

It is said that emulsification takes place, dirts and greases are loosened and suspended and flushed away, leaving clean surfaces. Painting or lacquering can be done soon thereafter. Since emulsification takes place in water, the Run-

Easy
RECIPROCATING ELECTRIC SANDER

SAVES YOU up to 75% on TIME, LABOR and ABRASIVES

DE-BURRING
•
SANDING
•
RUBBING
•
POLISHING
•
WET or DRY APPLICATIONS
•

The fast straight line reciprocating action of the EASY Sander mechanically duplicates the approved back-and-forth motion of hand finishing. Proven indispensable for hundreds of new or maintenance jobs on wood, metal, transparent plastic, alloy, and other materials.

WRITE FOR LITERATURE and ask us for a free demonstration. Let us prove that the EASY will speed your production, even with inexperienced help.

DETROIT SURFACING MACHINE COMPANY 7429 W. Davison Ave. DETROIT 4, MICH.

ARE YOU SATISFIED
with the results of your Filtering?

Sometimes a mere suggestion as to the grade or type of filter media or filter aid makes a big difference.

Permit us, through one of our field engineers, to analyze your filtering problems with you.

Remember, Sparkler specializes in filters only.

Write today and send product sample for filtering analysis— no obligation.

SPARKLER HORIZONTAL PLATE FILTERS

50 to 10,000 G.P.H.

SPARKLER MANUFACTURING CO.
254 LAKE STREET MUNDELEIN, ILLINOIS

ning Gear solution or solvent does not easily or quickly become loaded with the oils or greases which are removed. They are flushed off in the water.

Running Gear is said to be a combination solvent and alkaline cleaner. The operating solution may be used at room temperature or at a higher temperature up to 90 deg. Fahrenheit.

M.S.A. Goggle Cleaning Cabinet

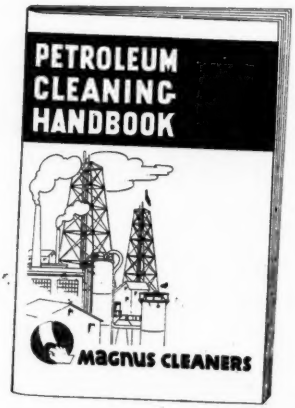
The M.S.A. Goggle Cleaning Cabinet shown in the illustration has been developed by Mine Safety Appliances Company, Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa., to encourage workmen to wear their goggles and keep them clean. Compact in size, the cabinet is equipped with Fogpruf, an efficient lens cleaning and anti-fogging agent, and optical wiping tissues. The unit is ideal for mounting in strategic work locations and in repair rooms, tool rooms, locker rooms or on traveling goggle dispensing carts.

Two vials of Fogpruf are concealed within the dispensing block, permitting the cleaning of two pairs of goggles at one time. A tap on either button of the dispenser sprays Fogpruf on the lens.

M.S.A. Goggle Cleaning Cabinet

Cleaning tissues are withdrawn from an opening in the top of the dispensing station. A sliding panel permits quick replacement of Fogpruf and tissues, also making accessible a compartment for an additional supply of Fogpruf.

Petroleum Cleaning Handbook. The Magnus Chemical Company, Inc., has issued an illustrated handbook for the petroleum industry, entitled "The Petroleum Cleaning Handbook." For easy use and reference, the handbook is divided into three sections. Under the first



heading "Cleaning Problems in the Oil Field" are discussed such subjects as: Cleaning Drilling Engines and Engine Rooms: Derricks, Power Houses, Storage Tanks, Tank Cars and Tankers, Oil Barges, Salvage and Company Houses.

The second section discusses "Clean-

KREIDER Centrifugal DRYER

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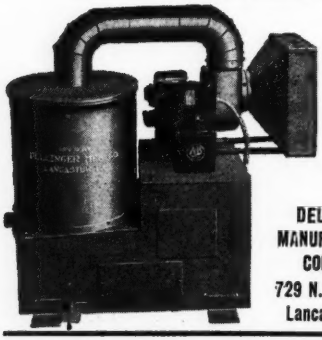

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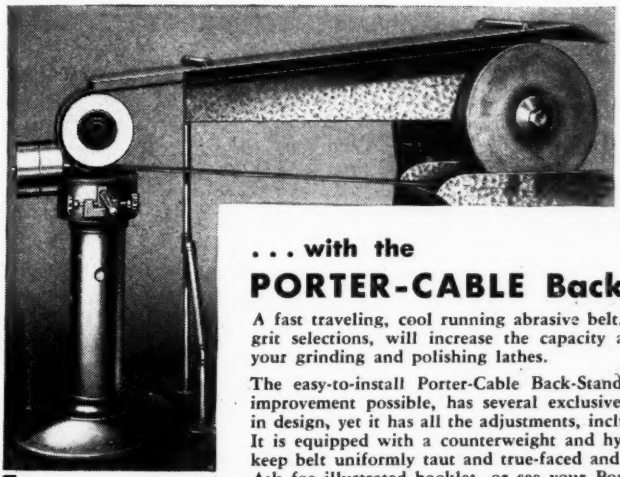

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ing Problems of the Pipe Lines," covering cleaning in pumping stations and tank farms.

The section devoted to "Cleaning Problems of the Oil Refinery" contains information on cleaning storage tanks, bubble towers and fractioning columns, heat exchangers, barrel and drum washing, filter press and cloth washing and general cleaning in oil refinery buildings.

The handbook also contains a summary of each of the Magnus products used in the pretroleum industry. A convenient ,bound-in return post card makes it easy to request additional information on any of the Magnus materials mentioned in the manual.

Copies of the hand book can be obtained by writing to the Magnus Chemical Company, Inc., Dept PF, Garwood, New Jersey.

Metallizing Booklets. Catalog 42B recently issued by Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y., describes Metco metallizing guns, wires, surface-preparing tools and other metallizing accessories in detail. In addition, it tells how sprayed metal coatings are saving critical materials and manpower in the production and maintenance of war-needed parts and equipment.

This company is also offering a limited number of copies of its 80-page Metallizing Handbook to present and potential users of the metallizing process. Profusely illustrated with photographs and diagrams, this handbook covers every phase of the process from surface preparation to spraying techniques and the finishing of sprayed metal coatings. Price, $1.00 post paid.

Tumbl-Spray Metal Washing Machine. Bulletin No. 9 describing the American Tumbl-Spray metal washing machine, manufactured by American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind., has been completely revised to incorporate recent design improvements of the machine. The Tumbl-Spray metal washing machine is designed for removing chips, dirt, grease and oil from machine parts, stampings, screw machine products, and so on. By means of its special endless tumbling conveyor, the Tumbl-Spray achieves

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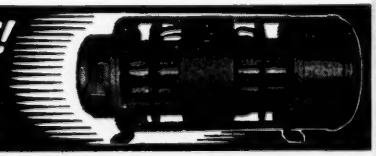

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complete exposure of work to the cleaning action of the high pressure sprays.

Mechanical features, construction and operating details, and specifications are fully covered in the circular. Schematic drawings and diagrams are included to illustrate all important features and operating sequences.

Short descriptions of the other models of the complete American metal washing machine line, including the Conveyor-Spray, Monorail-Spray and Tabl-Spray machines are included. Copies of the circular may be obtained by writing to the manufacturer.

1944 Plastics Catalog. Publication of the 1944 Plastics Catalog brings up-to-date the history and achievements of plastics materials in every branch of industry. The new edition contains more than 1,000 pages of interesting, informative, authoritative material, to encompass the expanding scope of plastics production and development. The editors of the book have selected 40 typical and important plastics developments used by the various branches of the armed forces, including the M-52 trench mortar fuse, the helmet liner, the raincoat and other large-scale plastic applications.

The book is divided into 12 sections under the following headings: Plastics in War; Tests and Specifications; Materials; Engineering and Molding; Fabricating, Finishing and Assembly; Machinery and Equipment; Laminates, Plywood and Vulcanized Fibre; Coatings, Synthetic Fibers; Synthetic Rubber and Rubber-Like Plastics; Index and Directory. A special chart details in flow-sheet form the manufacture of raw plastic materials. The section on Tests and Specifications is an innovation which includes Procedures on the Identification of Plastics, a list of Standard Testing Methods and the approved ASTM Specifications for Plastic Materials. Also included is a complete Directory and Index section which gives plant and personnel information of plastics manufacturers; complete glossary of commonly used terms; up-to-date bibliography, including foreign language publications, and a list of educational institutions sponsoring plastics courses. Price per copy: $6.00.

Electronic Control. The fundamentals and the various applications of electronic control are interestingly described in a 12-page bulletin (GEA-4126) recent-

Testing finishes simplified by Taber ABRASER

Comparative tests for adhesion, wearability and toughness of paint, lacquer, enamel, electroplate and similar finishes are accurately made from four-inch specimens. Results totalled on built-in counter in terms of wear cycles. *Write for Bulletin 2014.*

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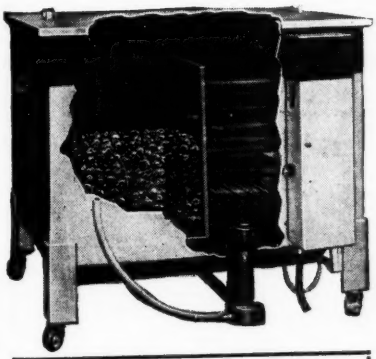

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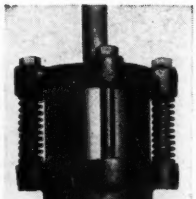

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ly issued by the General Electric Company, Schenectady, New York.

Well illustrated, the publication explains in clear, simplified language the fundamental principles of electronic tubes and their operation, describes the construction of the well-known thyratron tube, and lists the functions of eight of the more widely used industrial-type tubes.

The publication also describes and illustrates many practical applications of electronic control, including rectification, resistance welding, timing, and processing operations, as well as photoelectric installations involving counting, sorting, weighing, measuring, registering, illumination, and the control of cement kiln temperatures. Many of these applications have been in successful operation for a decade or more.

Also listed in the publication are the various advantages afforded by the use of electronic control, such as flexibility, precise control, low maintenance, and quiet, fast, automatic operation.

"Design for Efficient Industrial Seeing" is the title of a brochure prepared to help those persons in industry who must consider lighting-for-seeing problems. The booklet contains important data on balanced lighting, with illustrations which point out the correct and incorrect uses of lighting. Copy of the folder free upon request to The Fostoria Pressed Steel Corporation, Fostoria, Ohio; please refer to the title in your request.

"Right on the Nose." An illustrated booklet entitled "Right on the Nose," which explains in detail the quickest, easiest methods of adjusting non-prescription industrial safety goggles so that workers can wear them in comfort, has been published by the American Optical Company, Southbridge, Mass. Free copies can be obtained by writing the company direct.

The booklet was prepared for safety directors, medical directors, or other persons assigned to the job of fitting goggles. The objective behind the booklet is to help prevent eye accidents caused by workers refusing to wear improperly fitted safety goggles which may be uncomfortable.

A training film on the same subject and bearing the same title has also been produced by American Optical for goggle fitters. This sound motion picture 16 mm. film is available on a free loan basis, and prints can be obtained direct from the company.

Cleaners for Effective Metal Cleaning. Bulletin C-105 issued by the Hanson-Van Winkle-Munning Co., Matawan, N. J., deals with the selection and use of cleaners made from water solutions of alkalies, soap-alkali mixtures and soaps. These solutions remove oils, greases and waxes of animal, vegetable and mineral (petroleum) origin, and the inert solid materials contained in them. These inert materials may be: (1) metallic chips or borings from machining, (2) abrasive ingredients of polishing or buffing compounds, and (3) various dirts incident to producing and fabricating the objects cleaned.

A total of 19 special cleaners are described, including eight alkali cleaners of the soaking type for steel, aluminum, zinc, brass, copper, nickel-silver and soldered work; six electric cleaners for steel, brass and other non-ferrous metals, and five different soap cleaners for removing buffing compounds from brightly polished surfaces of brass, aluminum and die castings.

The bulletin also includes an interesting discussion of metal cleaning processes in general, giving in simple language the fundamentals involved in this type of work. Copies available on request.

Emulsion Technology. A Symposium. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 290 pages. Price, $5.00.

Because of the new developments in emulsions and the role they are playing in industry, this book is of special importance. Many specialists, in various lines of industry and science, have contributed authoritative information in this field. The book should be helpful to the beginner as well as to the specialist.

It covers the theory and application of emulsions and emulsifiers in agriculture, road-making, food, rubber, leather, wool, paint and varnish industries, and so on. Much valuable data concerning the equipment used in technical emulsions are included, as well as an extensive bibliography. A comprehensive list of emulsifying agents and many formulas of commercially used emulsions are also included. The book is recommended to chemists and industrialists who desire to improve their present products or to create new ones.

★ ★ ★

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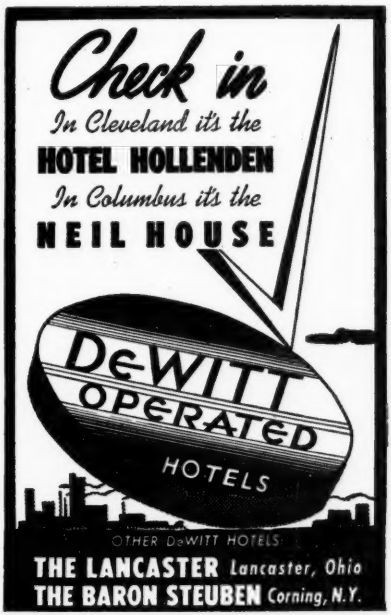

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CATALOGS

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Fire Extinguishers

"Inspection and Maintenance of Fire Extinguishers" provides valuable information on the care of fire-fighting equipment and is available from Walter Kidde & Company, 245 Main St., Belleville, New Jersey.

2. Silco

Data on Silco, an inorganic, vitreous-type, low baking point finish for steel, which is resistant to corrosion, abrasion, high heat, impact, scratch, acids, mild alkalis, and solvents, is available from Mitchell - Bradford Chemical Company, Bridgeport, Connecticut.

3. Metal Cleaning Equipment

A four-page folder which illustrates and describes a well-rounded line of equipment for cleaning war products such as cartridges, gun barrels, shells and similar products is now being issued by the Alvey-Ferguson Company, 162 Disney St., Cincinnati, Ohio.

4. Cleaning with Sun Spirits

Interesting case histories of the use of Sun Spirits in metal cleaning are described in a folder issued by Sun Oil Company, Philadelphia, Pennsylvania.

5. Deoxodizing

The process of Deoxidizing steel artillery shell cases or other steel and aluminum ordnance parts for varnish and paint finishes with Deoxidine No. 170 is the subject of a folder available from American Chemical Paint Company, Ambler, Pennsylvania.

6. Cleaning and Finishing

A data book which contains important information on the design and applications of Howard metal cleaning and finishing machinery has just been prepared by Howard Engineering & Mfg. Co., 1056 Hulbert St., Cincinnati 14, Ohio.

7. Metal Parts Washers

Various models of Detrex Washers are pictured and described in a catalog issued by the Detrex Corporation, 13017 Hillview Ave., Detroit, Michigan.

8. Shell Cleaning with DuBoy Products

A data sheet describing the soaker tank method with Actex 200, the solvent method with Actusol, and the industrial washing machine method with Actex 200 is now being distributed by The DuBois Company, 1120 W. Front St., Cincinnati, Ohio.

9. Instruction Manual

Latest technical data on the use of Oakite Compound No. 84, an acid-detergent material for ridding ferrous and non-ferrous parts of deposits that require a special type of acidic action to remove them, is given in a manual available from Oakite Products, Inc., 20 Thames St., New York 6, N. Y.

10. Lead Plating

Harshaw Chemical Co., 1945 E. 97th St., Cleveland, Ohio, has available a bulletin which describes lead plating with Harshaw fluoborate lead solution concentrate--suggested uses, solution preparation, equipment and procedure.